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REPORT

OF THE

ROYAL SOCIETY of SOUTH AUSTRALIA.

VOL. V.

(FOR 1881-82.)

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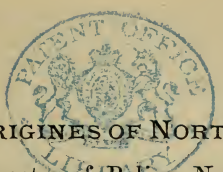


Notes on the Aborigines of North Australia.

By Paul Foelsche, Inspector of Police, Northern Territory; Corr. Memb.

6.8.85 Not v Complete.

[Read August 2, 1881.]

A good deal has from time to time been written about the aborigines of Australia, and a vast amount of information on this subject has been gathered from all the settled parts of Australia; but all that is known of the aborigines inhabiting the northern portion of this continent has been furnished by a few persons who have paid only short visits to the north coast of Australia, and consequently had not sufficient time to get well acquainted with the natives, their habits and customs. I, therefore, venture to supply a few notes on the above subject, such as have come under my observation during eleven years' residence in the Northern Territory. They may be of no great value, but when compared with the valuable paper on the "Aborigines of South Australia," by Mr. J. D. Woods, in the Society's Transactions for 1879, may furnish some information either in support of or against the supposition that the aborigines all round the Australian coastline have sprung from one source, as well as some new facts hitherto not brought under the notice of the Society.

PHYSICAL CHARACTERISTICS.

The few accompanying portraits of men and women of different tribes by way of illustration will show that the physical characteristics of the natives inhabiting the north coast of Australia vary considerably from those in the south, especially as far as the features are concerned. The majority of the men are well built, but the skin is smooth, and the strong covering of hair all over the body so often met with in the south is almost entirely absent on the north coast, at least among those tribes with which I have come in contact; and the growth of hair on the face is very scanty, but on the head it is invariably thick and curly, and I have met with instances where it strongly resembles that of the Papuans, but these are very rare. The women, as a rule, are not so stout as in the south, and with a few exceptions the hair is not so curly as that of the men. The hair of both sexes is, in my opinion, not near so black as in the south; but all this may be the

results of climatic influences. The mouth, as a rule, is not so wide, and the noses not so flat, although the custom with both sexes of wearing sticks through the nose has a tendency to flatten it considerably. They have good strong teeth, but, as far as I remember, not so beautiful as those of the south. Physically speaking, the strongest tribes I have met with are those on the Alligator Rivers in Van Diemen's Gulf—a great many of the men are over six feet high, and well proportioned. I have only been able to get a few samples of photos. of these tribes, as they very seldom come near the settlements.

LANGUAGE.

Each separate tribe speaks a different language or dialect, but whether they are only a modification of one form of speech or not I am not in a position to state. It is surprising in what remarkable short time all natives learn to speak English. All natives round the coast, from the Coburg Peninsula to the mouth of the Roper River, in the Gulf of Carpentaria, speak the Malay language, acquired by long intercourse with trepang fishers from Macassar, who visit the coast in their prahus during the rainy season, and employ the natives as divers, &c.

LAWS.

Murder is punished with death, except when a native is killed by one of his own tribe, in such case the offender is punished by spearing him severely; but care is taken that he is not mortally wounded. If a native kills one of another tribe, a party of young men is sent out by the tribe of the deceased to kill the murderer if he can be found, if not, one of his near relations has to suffer in his place, and after a lapse of some time that tribe visits the former, and a fight with small reed spears takes place, without any serious consequences, after which the tribes are on friendly terms again.

Disputes between two or more of the same tribe are settled among themselves by fighting it out, if they cannot otherwise agree.

Theft is punished by the offenders, of both sexes, having to submit to being speared, after which—in the majority of cases—they are allowed to retain the stolen property. This is looked upon as a reproach, and the thief generally disposes of the property by giving it to a neighbouring tribe.

Adultery is not much thought of; the woman offender only receives a beating with a small stick, and the male offender has to submit to a small reed spear being thrust through his arm by the suffering husband.

Intermarriage between near relations is looked upon as a grave offence, and is the cause of constant quarrels between the offenders and the other members of the tribe; the former

are incessantly subject to being speared, which invariably ends in the death of one or both of the offenders. But should they be lucky enough to live till they have an offspring, then all quarrelling ceases, and the marriage is looked upon as legal.

Elopements and stealing of "lubras" are of frequent occurrence, and causes little or no row and fighting. It occurs only among young people, and the old men—who very often have several young lubras—are generally the sufferers. If a young lubra fancies a man, and asks him to go away with her in the bush, there is no quarrelling; but if a man takes or persuades a lubra to run away with him it causes a row, and often ends in fighting. After the parties have cohabited together for a night or two, and like each other, they live together, and after a while return to camp as man and wife. If, on the other hand, they are not pleased with each other, they separate at once, return to camp, and no more is said about it.

In any kind of offence after the law—such as it is—is satisfied, not a vestige of enmity seems to remain, and the matter in dispute is never referred to again. I have never known a second quarrel to arise out of a dispute once disposed of.

MARRIAGE.

There is no ceremony connected with marriage; in the majority of cases it is arranged when the parties are mere infants, and in many instances female children when born are promised to men of all ages; this accounts for so many middle-aged and old men having mere children for wives. As soon as the girl arrives at the age of puberty, and has undergone certain ceremonies, she is handed over to her affianced husband, whether young or old, who takes her to his camp, and she then travels about with him wherever he goes. If the husband is old, he very often has his young lubra stolen from him by a young man who has not been lucky enough to have one given to him, and in some instances young lubras themselves propose to young men to run away with them. If a young man has a sister not promised to any one, he gives her to another man who has a sister similarly situated, whom he takes in exchange. Sometimes, if a husband gets tired of his wife, or she does not suit him, he gives her away to another man, generally to one of another tribe; but such cases are by no means frequent occurrences. I have never heard of a husband selling his wife, perhaps for the simple reason that they have no real or personal property beyond a few spears to give in exchange.

Men often send their wives to each other for one or two nights, or to any favoured individual; this is looked upon as a particular act of friendship.

Polygamy is universal, and I know natives who have as many as four wives. When a husband dies his wife or wives and children become the property of his brother or next of kin, irrespective of their having a wife or wives of their own, provided the widows are not too old, in that case they remain widows.

There is no restriction as to marriages, except among blood relations; but if parents are of different tribes, the children belong to the father's tribe.

CHILDREN.

The average of births of children is not more than two to each married woman. It is the custom of some tribes, if the wives have more than three or four children, to kill the newborn ones. The reason assigned for this is that they encumber the parents in travelling about for food. Generally speaking natives are very fond of their children. There are very few half-castes, and it is generally believed that many of them are killed, although the natives do not admit this.

CANNIBALISM

Is practised by all natives on the north coast with whom I have come in contact, with the exception of a very small tribe inhabiting the immediate neighbourhood of Port Essington. This tribe is the most civilised on the northern coast, having for years been under the influence of the military who were stationed at the old settlement at Port Essington, which was abandoned in December, 1849. The eating of grown-up people—that is, of natives—is, as far as I can ascertain, not practised. Only children of tender age—up to about two years old—are considered fit subjects for food, and if they fall ill are often strangled by the old men, cooked, and eaten, and all parts except the head, which is skinned and buried, are considered a delicacy. Parents eat their own children, and all, young and old, partake of it. The only instance I have heard where grown-up people have been eaten, was that of two Europeans who were out exploring in the neighbourhood of the Tor Rock, about forty miles inland from Mount Norris Bay; this was in 1874. These unfortunate travellers were, according to the statements of the friendly natives, killed by the "Tor Rock" tribe, cooked and eaten; and from my own knowledge of the natives in that neighbourhood I have no reason to doubt this statement to be correct.

CORROBORIES.

They are of a similar character as in the south, and are performed on various occasions, such as when different tribes visit each other, when members of the tribe die, when returning

from a friendly visit to another tribe, when they feel inclined to be jolly, when preparing for fighting with another tribe, when portion of a tribe are about to start on some expedition and when they return, and on many other occasions either of friendly or hostile nature. Sometimes these corrobories last all night, and on mostly all occasions the men paint themselves. At corrobories in honour of the dead, men and women paint themselves red, white, and yellow; on all other occasions any colour they fancy, which sometimes takes hours to put on, and covers the whole body, when they very much resemble in appearance the clowns in circuses. Corrobories of a war-like nature are generally held before sundown; for the dead, before and after sundown; and on all other occasions after sundown, whether moonlight or dark.

FUNERALS.

Dead children up to about the age of two years if in good condition are with few exceptions not buried, but eaten; above that age and up to about ten years they are buried about eighteen inches deep in the ground, and are never disturbed. After the body is buried all natives in camp blacken themselves with charcoal, and squat down around a heap of yams prepared for the occasion, which are eaten by all present; after which, if deceased is considered to have been a good boy or girl, they corroborie till sundown. On the next day a short pole about three feet long and six inches thick is put in the ground close to the camp, and painted red, white, and yellow. The natives then paint themselves of the same colours, and in the evening corroborie again for a short time; and next day the camp is deserted—unless it is an old favourite camping place—and locate themselves some short distance away. The painted pole is left in the ground. When young grown-up people die they are rolled up in bark perforated with pointed sticks or leaves to allow the liquid to run through. A corroborie is held, and the body is taken to some chosen tree and put up in the branches, on which bark is laid for the body to rest upon. On this the body is placed, and covered over with bark. They then return to camp and corroborie again; after which a pole, similar to the one put up for children, is planted in the ground and painted as before mentioned, and the natives paint themselves the same colours—red, white, and yellow—and corroborie for three successive nights; after which the camp is deserted, and a new one formed some distance away. When old people die the body is left on the ground till decomposition has well set in, when the body is buried in a shallow grave; up to this time corrobories are held night and morning. After the body is buried corrobories

are kept up for several nights, all night through, and on these occasions a great deal of red, white, and yellow paint is used by both sexes. After two moons the bones are looked at, and if the flesh is off them they are collected in a basket by old men and put in a tree close to the camp. If the flesh is not off the bones when the grave is opened it is filled up again, and the remains are left undisturbed. The day after the bones are gathered together and put in a tree they are taken into camp, and a corroborie follows. The following night the corroborie is kept up till next morning, and the bones are buried in a small hole about two feet deep. The Port Essington natives have a custom after all the bones have been collected together to carry them about with them in a basket for a long time, sometimes for over twelve months; but this is chiefly done by the women. Sometimes old people, relations of the deceased, at certain times give way to fits of sorrow and grief, which is demonstrated by wailing and lamentation; at the same time they cut themselves with any kind of sharp instrument over the head, arms, and body until large clots of blood cover the wounds.

RITES AND CUSTOMS.

The youths, before being admitted into manhood, have to undergo certain rites and customs, in many respects similar to those practised in the southern colonies. With the exception of the few coast tribes from Port Darwin eastwards to the Liverpool River circumcision is practised by all the tribes with whom Europeans have come in contact; it is performed at about the age of from sixteen to eighteen years, after which they are entitled to all the rights and privileges of the tribe.

The youths of those tribes that do not circumcise have to pass through several stages between the ages of twelve and twenty-four years before they are admitted into manhood. A few tribes have a custom of knocking out one of the upper front teeth. This is done at about the age of fourteen years but does not seem to be compulsory, and the custom appears to be dying out.

In some tribes the young females are subject to some revolting customs before they are allowed to be married or rather allowed to cohabit with their affianced husbands; but these customs are of such a disgusting nature that they are not fit to be mentioned here. Between the ages of twelve and twenty years, both males and females mutilate their bodies by making cuts in the flesh on the upper parts of the arms, just below the shoulder joints, across the chest, body, rump, and thighs, and raise large scars or wheals by way of ornamentation. This is done with a sharp kind of white flint stone, the same as is used for spear heads; they then chew leaves of a native plum-tree,

and put it in the wound. This is left till it begins to fall off, when the flesh is found to have grown considerably above the surface of the original wound, sometimes to the extent of half an inch; it is then allowed to heal. There is no fixed rule as to how many cuts are to be made on the different parts of the body, but is left to the option and fancy of each individual person.

The septum of the nose is also pierced, but this is done at a very early age; it is done for the purpose of wearing a bone or stick through it as an ornament, but is only worn till they become middle-aged, and never by old people. The only reason assigned for this custom is—giving their own words—"to make young girls and boys look nice."

A singular custom prevails amongst the Larrakeah, Woolnah, Woolwongah, and Irambal tribes, inhabiting the neighbourhood of Port Darwin, Port Patterson, and Daly River. It is to remove the first two joints of the index finger of the right hand of some of the young females when of the age of about two years. There is nothing compulsory about this custom or rite, but is decided by the parents whether it is to be done or not. It is generally believed that females on whom this operation is performed, when grown up, are able to find plenty of yams and other food for their husbands and families.

The operation is performed by making a ligature of large spider webs found in the jungles, which is tightened daily till the joint drops off, when it is buried; the wound is then covered over with chewed leaves of the native plum tree, and in about one month the flesh is grown over the bone and the wound healed. The leaves of this native plum tree, when chewed and placed on a wound, seems to have the property of promoting granulation, for after the finger has fallen off the whole surface of the joint is exposed, and in a month's time it is nicely covered over and healed.

DISEASES AND CURES.

Smallpox.—The disease most dreaded by the natives is smallpox—for which each tribe has, of course, a different name. It makes great havoc among the tribes that get infected. The last time this disease made its appearance on this coast is, as far as I can judge and ascertain, about twenty years ago. According to the tradition of a native living at Port Darwin named "Mangminone," alias Mr. Knight, about 25 years of age, he had the smallpox when a boy of about five years (this man is deeply pitted all over the face), and sometime before the white people arrived at Escape Cliffs—the Hon. B. T. Finniss's expedition in 1864. The disease broke out in the dry season, when the natives burned the grass. Old and young

were striken down with it, and a great many died, so much so that they could not bury them all, but left the corpses lying about. Among those that recovered were several who became totally blind, and there are now four of these living in this immediate neighbourhood. The disease lasted only during the dry season, from about May to November, and disappeared when the wet season set in. The Port Darwin natives call the disease "Goobimwah," and state it came from the Alligator River tribes, and travelled westward, but how far it went I cannot ascertain; no doubt it spread a long distance inland, as pock-marked natives are found among all the inland tribes.

The tradition of the Port Essington natives of the appearance of smallpox in their tribe is very similar to that of the Port Darwin natives. Some of the Port Essington tribe (called "Yiárick," also "Unállah," now numbering only about thirty all told) who had the disease are still alive, and from information gathered from them it leaves no doubt but that the malady raged there the same time and year it was at Port Darwin. They state it was a long time ago, and a long time after the soldiers had left (the old settlement was abandoned in December, 1849), and came one year shortly after the Malay prahus had started back for Macassar (about the end of May), and when the grass was burned it came from the tribes to the eastward of them, and went on to the Alligator and other tribes to the west of them. Plenty of old and young (and even dogs) died, but by the time the rain came on (about October or November) the disease had disappeared.

One of this tribe named Jack Davis (a name given him by the soldiers), who is very intelligent and speaks English and Malay fluently, informed me that very old people had told him that when they were children smallpox (called by them "Meeha-meeha") killed plenty blackfellows, and adds that by-and-bye, when he will be an old man (he is now about 50), "meeha-meeha" come on again.

Malay prahus, about 30 in number, visit the coast eastward from Port Essington to Blue Mud Bay in the Gulf of Carpentaria every year in search of "beche-de-mer," and have done so in all probability for centuries past. They arrive from Macassar the beginning of January, and leave again the end of May. During the time they are here they employ all the coast tribes trepanging for them, and they all live together; and I think there can be no doubt as to smallpox having been brought to these shores by them, and on the last occasion by a prahus that visited the Gulf, for they leave so soon as the South-East monsoon has fairly set in, and shortly after the prahus had left the disease appeared, coming up the coast from the Gulf with the S.E. winds, as stated by the natives, and

travelled through all the tribes to the westward. Is it not likely that this terrible disease, "the smallpox," was introduced here by these trepang-fishers some hundred of years ago, and then spread gradually all over the Continent?

The remedy the natives apply to cure smallpox is a thick milky-looking juice obtained from a leafless vine* found along the shores of mangrove flats. It twines in among other bushes, and is called by Port Darwin natives "Gaoloowurrah." This juice is put on the sores, and left till it forms a scab, which is washed off so soon as it gets loose, when the sore is found to be healed, the skin is white, and takes about a year to attain its natural colour. This remedy is said to be a sure cure, although some who used it lost their eyesight; but strange to say some patients object to having it applied, but why they cannot explain.

Fever.—Malarious fever is very prevalent among the natives, but they do not seem to have any remedy for this complaint, and it terminates fatally in many cases.

Boils are also frequently met with, and affect young andold alike. So soon as they make their appearance they are poulticed with leaves and hot water till they break.

Coughs and Colds are very common complaints among the natives, which they cure by eating a kind of grub found in mangrove trees, and drink the liquid with which the grub is surrounded when in the wood. This grub resembles very much the common earthworm.

Ringworm, or a very similar disease, is a plague from which the natives in the neighbourhood of Port Darwin suffer greatly. This disease spreads over large portions of the body, and I have seen the whole of the abdomen covered with it as well as the greater portion of the back. The natives say the Woolnahs bring this disease from the Adelaide River. It certainly seems to be very local, for it is not known at Port Essington, nor west of Port Darwin. The Alligator and Adelaide Rivers and Port Darwin tribes seem to be the only ones troubled with this complaint. The only remedy applied is to put the affected parts close to a brisk fire till the skin gets scorched, which they say kills the disease.

Syphilis is occasionally met with, but it is by no means common among the natives. I have seen only a few cases during the eleven years I have been here.

Venereal disease is rather prevalent, and they have some means of curing it.

Broken limbs are set with a good deal of skill and placed

* On my recent visit to the Northern Territory, the plant, which was shown to me by a native in company with the author, proved to be *Sarcostemma australe*, R. Br.—*R. Tate.*

in a kind of splint made of strips of bamboo and fastened together with string made of the bark of Banyan trees, and large enough to go round the injured limb. It is then tightly secured with string, and left till the break or fracture is healed. Should inflammation set in the part is bathed with hot or cold water.

Neuralgia is cured by making a poultice of the fruit of the red *Eugenia*, if obtainable, by roasting them in the fire, mashing them up and putting it while hot on a piece of soft bark (paper bark), which is placed over the affected part till all the moisture is absorbed and the poultice quite dry, when it is replaced by a fresh one. According to the statement of the natives, the second application invariably cures the complaint.

Gatherings in the ears, from which the natives suffer a great deal during the wet season from lying on the wet ground, is also treated with the above-mentioned fruit by squeezing the juice after the fruit is roasted into the ear.

Lunacy in a mild form is occasionally met with, and the natives have great faith in the application of iron bark and native plum-tree leaves heated over a fire, with which the whole head and face is covered.

Wounds are not much thought of, and are treated in various ways. Spear-wounds are generally stopped up with pounded bark of the native plum-tree, to keep out the air; fresh boiled urine is freely applied, which generally heals the wound, unless internal injury has been received.

Cut wounds and old sores, especially of a constitutional nature, are treated with a resinous substance of a blood-red appearance, called by the Port Darwin natives "gnewáylah," and is obtained from a Eucalyptus tree. When taken from the tree it is generally very hard, but when put in water and squeezed it gets soft like putty. It is well washed, and all the dirt removed. It is then spread thickly on a piece of paper-bark like a plaster and applied to the wound or sore; and it is left on till it gets dry, which it does in a few days, when it is easily taken off; and if the wound is not closed, fresh plaster is applied until the sore is healed up. Fresh wounds are also treated with the scraped bark of a bush called by the Port Darwin natives "malimgarrácah." It is soaked in urine, and applied to the wound. The juice obtained from the bark of the milk tree, and called "gaolooanúlkah," is said to possess extraordinary healing properties. It is applied to the wound with the finger, and is very sticky. The natives state this juice destroys the eyesight if a drop should get into the eye, and they always shut their eyes when cutting the bark to get the juice.

I have a native in my employ who had a good-sized sore on

his foot which, according to his own statement, came of its own accord. Our medical officer here attended to it for upwards of six months; occasionally the wound got smaller, but always opened out again, and would not heal up. At last the native got tired of this treatment and applied the resinous substance mentioned above. At this time the wound was about one-and-a-half inches long and three-quarters of an inch wide, but not deep; in about a fortnight's time he removed the plaster, when the wound was properly healed.

Snakebite is treated by putting ligatures some distance above and below the wound, and then open the largest artery in the vicinity of the bite with a sharp stone, shell, or other sharp instrument; several incisions are made until copious bleeding is the result, the ligatures are not removed for two or three days, when the patient is all right. I have never heard of a native dying from a snakebite.

On inquiry why the cuts are not made immediately over the bite, it was explained that the poison entered numerous small blood vessels which all run into larger ones through which it is disseminated through the whole body; thus it shows the natives have some knowledge of the anatomy of the human body. Bleeding is considered a cure for all sorts of pains in the head or limbs, and is resorted to very freely. This paragraph on diseases and their cures relates more particularly to the tribes in the neighbourhood of Port Darwin.

Doctors.—The tribes in the neighbourhood of Port Darwin have all recognised doctors, consisting of both men and women, but their knowledge of diseases is very limited, and the remedies they apply are very few, and what they cannot cure with them, they pretend to cure by charms. The remedies for diseases described in the preceding paragraphs are known to and practised by nearly all the elder members of the tribes, and acknowledged doctors pretend chiefly to cure internal diseases.

These doctors teach their pretended knowledge only to their own children, who again teach their children. This accounts for there being female doctors who are considered to possess all the qualities the men doctors do.

HUMAN FAT.

Nearly all natives use fat obtained from dead bodies of either their own or other tribes for anointing themselves with, which they believe makes them strong and able to fight well. The fat taken from all parts of the body is mixed with red ochre to prevent it melting away. It is then tied in paper-bark, and in this state is distributed among the men, and very often some is sent to other tribes. It is not used by women, nor have I ever heard of its being eaten.

WEAPONS AND CANOES.

The weapons are similar to those in the southern colonies, but shields and boomerangs are not used. The principal weapons are clubs and spears. The latter are of great variety. Some shaped out of solid pieces of wood are thrown by hand without the aid of woomerahs or throwing sticks. Poisoned spears are not used.

Canoes are made of bark, of similar size as in South Australia; but the ends, instead of being bent up, are cut slanting and neatly sewed together with fine strips of bamboo, giving them a sharp stem and stern. The gunwales are made of bamboo, thereby being nicely shaped. They are propelled through the water by small hand-paddles at a great speed. The Port Essington natives have acquired the knowledge of cutting canoes out of a solid tree from the Malays visiting that part of the coast every year trepang-fishing, from whom they also obtain the necessary tools for that purpose. Weapons and canoes form the only real property the natives possess, but do not accumulate them.

ROYAL FAMILY.

None of the natives on the north coast that I have met with have a recognised king or royal family, but the old men seem to be the rulers of the tribe, to whom all cheerfully submit. Any one individual distinguishing himself in war or in any other way is looked upon as a great man, and takes a prominent part in all disputes with other tribes.

SUBSISTENCE.

Australian natives in their wild state rarely provide for the morrow, and seem to have no idea to make provision for the future, and to this those inhabiting the northern portion of the continent are no exception. They start on a journey without a thought as to where the next meal is to come from, but as Nature has in this part of Australia provided a plentiful supply of reptiles, game, fish, &c., they procure sufficient as they travel along by the time they feel hungry.

Native yams grow plentifully in many places, and are much sought after as food, as also the roots of lilies growing in swamps and lagoons.

Their mode of procuring food is not attended with so much difficulty as people unacquainted with natives in their wild state imagine. Fish being plentiful in rivers, creeks, waterholes, and lagoons, it forms a principal part of the native food, especially along the coast. Large fish are speared, and at low tides small fish are left in holes on the reefs, and are easily caught; as also large crabs, which are plentiful. If they

cannot spear fish in waterholes or creeks, they strip the bark of certain trees, which is pounded with stones till the fibre gets soft. It is then put in the waterhole, which after a little while has the effect of stupefying the fish, and they float on the surface, when they are gathered up. Torches are employed by night, by which the fish are attracted and speared. Small nets made of the fibre of the bark of Banjan trees are also used for catching fish. Snakes, lizards, &c., are knocked over with sticks and stones. In the dry season the grass is set on fire, when all kinds of reptiles and other animals are easily secured.

Kangaroos generally have regular beaten tracks or paths leading to water, on which they are waylaid and speared.

Ducks and geese are killed in various ways. While feeding in swamps, the natives armed with short sticks crawl up to them among the rushes, and when near enough throw the sticks among the flock, which generally cripples some. The natives also climb up high trees near swamps, and with small sticks kill geese flying over to their feeding ground. But the more ingenious method of catching ducks and geese is to go into the water some distance from where the game is, cover their heads with lilies and leaves growing in the water, and then work their way with just their eyes and nose above water up to the game, which is seized by the legs and pulled under water. This method of catching game is also practised on the shores of Lake Alexandrina, in South Australia.

Another method of catching geese—which at certain times of the year are very plentiful—is to build a small bell-shaped hut among the rushes and swamps visited by geese. The hut is constructed of rushes, and a few holes just large enough to admit the body of a goose are made round the bottom of the hut. In these holes are placed young lilies and roots, on which the geese feed. A native then gets into the hut and closes it in at the top. The geese come feeding about the hut, and seeing the lilies and roots, put their head through the hole to get them, when the native inside the hut seizes them by the head, pulls them through the hole, and twists their neck off; others seeing their mates disappearing through the holes have a look in also, and are treated in the same way, and great numbers are caught sometimes by this simple process. Turtle, geese, and alligator eggs in all stages and condition are delicacies, and much sought after.

Yams of different kinds are, when in season, a considerable item of food for the natives. Some of these yams when eaten raw cause the mouth and throat to swell, accompanied by great pain. These yams have to be specially prepared to render them eatable. To do this a hole is scraped in the ground, which is paved with stones. A large fire is then made in the hole till

the stones are of a sufficient heat, when it is cleared out and the yams put in it. They are then covered over with leaves, and over all from four to six inches of earth. It is then left till next day, by which time the yams are cooked and all the noxious substance has disappeared.

Shellfish of all descriptions form an important part of subsistence to natives on the coast.

The natives' mode of preparing their food is very simple. Everything that requires cooking is prepared on hot coals; small animals are cooked whole; large ones, such as kangaroo, are torn in pieces and then cooked, and not the smallest particle is wasted.

Native fruits (not plentiful), roots of lilies and rushes, and tops of the cabbage palm, are eaten raw.

ORNAMENTS.

The ornaments worn by the natives consist of a stick through the septum of the nose, a sort of wig made of the hair of natives of other tribes, which is exchanged for that purpose. Kangaroo teeth are fastened on to locks of hair with a resinous substance used for fastening stone spear-heads on to bamboo shafts; the heads of small birds and ducks' bills are fastened on to the hair; bunches of white feathers fastened on to a short painted stick are stuck in the hair; and a narrow strip of bark painted white is tied across the forehead. Necklets made of grass stems cut in half-inch lengths, representing beads, are put on strings and worn round the neck; also long tassels with small tufts of feathers are fastened to the hair on each side of the head; the same kind of tassels are also fastened on to the elbows, and rings of grass are plaited round the arms above the elbow, round the wrists and fingers. Painted belts made of bark, and some of female hair, are worn round the waist, but all these ornaments, with the exception of a stick through the nose, kangaroo teeth, and ducks' bills in the hair, necklaces and armlets, are exclusively worn by the men, who also wear a large tassel about nine inches long and six inches wide to cover their nakedness. The Port Essington natives and those along the coast as far as the Roper River wear also ornaments made of proper beads obtained from the Malays visiting the coast.

SIGNALLING.

The natives have a system of conveying messages to each other at considerable distance, almost as far as they can see each other, by means of signs made with the arms. This system of telegraphing is greatly practised, even when at speaking distance, and consequently some are quite experts in

the art. It has been asserted that Masonic signs have been discovered among the natives in North Australia; but during my whole eleven years' residence here, during which time I have come in contact with a great many different tribes, I have noticed nothing approaching to Masonic signs, with which I am well acquainted. No doubt the above-mentioned system of telegraphing has been mistaken for these signs.

DRAWINGS

By natives are met with among all tribes, generally representing existing objects. The only imaginary object I have seen painted is the so-called "Devil-devil" (appellation borrowed from Europeans), an evil spirit in whose existence all natives believe, but for whom each tribe has a different name. Natives are constantly in dread of this evil spirit when travelling in the bush.

ORIGIN.

I once listened to a conversation between a Port Darwin and a Port Essington native. Being of different tribes, and speaking different languages, they commenced in broken English, which both spoke fairly. The subject of conversation was the origin of their race. Being at that time well-acquainted with the tradition of the Port Essington natives as to their origin, I felt anxious to obtain what information I could from the Port Darwin native on the same subject, and on questioning him he stated that he knew very little about it, but that "Lirrawah," of the Southport branch of the Larrakeah tribe, could give me the whole history, but that he was very reluctant to communicate to the other blackfellows. This native is a doctor, and held in great esteem by the whole tribe as a learned man, who, as they term it, "knows plenty all about." I embraced the first opportunity of "Lirrawah's" visit to Port Darwin to gain what information I could from him on the origin of his race, and on the promise that I would not tell other blackfellows, elicited from him the following disjointed statement:—A very good man, called "Mangarrah," lives in the sky among the stars, a place called "Teelahdlah." He made all living creatures upon earth, except blackfellows. He also made the trees, grass, water, and everything; and makes wind, rain, and thunder. He never dies, and likes all blackfellows.

Another good man called "Nangánburrah" lives in the bowels of the earth, a place called "Ahbybúggah." He a long time ago made one blackfellow, called him "Dawed," and taught him how to make blackfellows. "Dawed" made plenty of boys and girls, who grew up and multiplied. When "Dawed" was an old man the blackfellows growled plenty,

and would not do what he told them; he then made them very ill, and plenty died, but some got better. "Dawed" then caught some geese, and told blackfellows to eat them, but some old women refused, saying the geese were no good; "Dawed" then made the first spears, and speared the old women in the legs, when a strange blackfellow called "Shares" appeared, helped the old women, and took them to his own country called "Tooparánlah;" "Dawed" followed him, and demanded the women back again, which was refused. "Shares" and these women had plenty of children, which now form the "Woolwángah" tribe, inhabiting the country between Southport and Pine Creek. "Shares" was a bad man, and when he died turned into a large stone in the Pine Creek country. This stone the natives state is situated on a large creek, and is much feared by them. They say any one touching it will soon die.

"Dawed," when he found he could not get the women back again from "Shares," went to "Língowah," a place on the Adelaide River, where he saw a beautiful young girl called "Abmáhdam." He liked her, but she refused to go with him; he then sent something from his own person which had the appearance of a snake. This fetched the girl to him, and he had intercourse with her.

"Dawed" then went back to his own country, and the girl remained on the Adelaide River, where, in course of time, she had plenty of babies, who grew up and now form the "Woolnah" tribe on the Adelaide River.

"Abmáhdam" afterwards died, and turned into a tree at a place on the Adelaide River called "Layláyloo." "Dawed," after making all about blackfellow, died and also turned into a tree on the Adelaide River at a place called "Ahlee áhlee." These trees, the natives assert, are still growing on the Adelaide River, and are much reverenced, for "Dawed" and "Abmáhdam" have been good people. Near the place where "Dawed" turned into a tree, when he died, there is a large waterhole highly reverenced by the natives, who believe that sick persons bathing in this water get cured. "Dawed" also taught all the blackfellows how to make the different kinds of weapons and all the other things which blackfellows are now making.

"Nangánburrah," who lives in the ground, is designated "all same Government." He can read and write, and when blackfellows growl write it down in a book. When blackfellows die they go down into the ground to "Nangánburrah," and if they have been good, which is ascertained by referring to the book, "Nangánburrah" gives them a letter to give to "Mangarárrah," with whom they then live among the stars. If they have been bad and growled they are sent to a place deep down in the ground called "Ohmar," where there is

plenty of fire; and long way under this place is a large water called "Búrcoot," where one blackfellow named "Mádjuit-Mádjuit" sits down. He regulates the tides according to the changes of the moon. He, like "Mangarárrah" and "Nangánburrah," never dies.

The tradition of the natives in the neighbourhood as to their origin is as follows:—A long time ago a big woman called "Warahmoorúngee," in a state of pregnancy, came from the North, there being no water on earth at that time. She arrived at Port Essington, and finding it to be a good country she made a large fire in the ground, which, when burned out, made the sea and all the water. She then left plenty of blackfellows of both sexes and went further away into the bush, made more water and left more blackfellows, and gave each tribe a different language. After this she left a fire in the ground a long way in the bush, and set three blackfellows to watch it to prevent it breaking out. Should they neglect to look after it the fire will come and burn all blackfellows. "Warahmoorúngee," after walking about a little longer, died and turned into a stone a long way in the bush.

These natives have no idea of a future state of existence.

Note A.

Melville Island, about 30 miles north of Port Darwin, is inhabited by a tribe of which very little is known. They do not circumcise, and speak a different language from those on the mainland. They are represented as a very strong and powerful race.

Before the arrival of the Hon. B. T. Finniss at Escape Cliffs, in 1864, the Melville Island natives occasionally visited the mainland for the purpose of stealing lubras, in which they invariably succeeded; but they have not done so since. This tribe is of a very hostile nature, and on several occasions have attacked Europeans visiting the island. Their canoes and weapons are similar to those on the mainland.

Note B.

A tribe or tribes inhabiting the western coast of the Gulf of Carpentaria, and for about 100 miles inland, between the Roper and Nicholson Rivers, have a most disgusting and unnatural practice of slitting the penis along the urethra from its opening right down to the root. When about the age of fourteen years the youth are circumcised by the old men without any particular ceremony or formality, and when about eighteen years old the operation of slitting up the urethra is performed on those selected for that purpose. It is done with

a sharp shell or mussel, and sometimes with a white flinty kind of quartz, which is procured from some distance under ground, and the hole is carefully covered up again. After the operation a small stick or bone is placed in the canal to keep it open. As the wound heals the penis shrivels up, and has, in its collapsed state, the appearance of a large button. According to the statement of the women the men so operated upon cannot beget children, although able to have connection with them, and for that purpose are preferred to the others. It appears that the strongest and able-bodied youths are generally selected for this operation, which is considered an honour among the tribe.

For the information on this subject I am indebted to Mr. George de Lautour, who has on several occasions travelled through these tribes, and at my request collected the above information.

Plants Indigenous to the Neighbourhood of Hermannsburg,

on the River Finke, Central Australia.

Collected by the Rev. H. Kempe, Corr. Memb.

[Named by Baron F. von Mueller, K.C.M.G., F.R.S., &c., Hon. Fellow.]

[Read February 7, 1882.]

Encouraged by Baron F. von Mueller, who informs me that the most common plants have been sent in by me, I continue the list of plants indigenous to this part of Central Australia, which was commenced in vol. 3 of the Society's Transactions, pp. 129 to 137. The present communication gives the names of the species identified by Baron F. von Mueller, which had been sent to him during the course of the year 1881. The names of a good many critical species, not always obtained in a state of perfection, are still to be expected.

It may be interesting to know that all the country round here consists of limestone. Even where there are sandhills the underlying rock is limestone, so that nearly all the soil is calcareous. The James and MacDonnell Ranges are made up of red sandstone (in my opinion Tertiary sandstone) and granite. The southern hill of the MacDonnell Ranges consists of a sort of conglomerate.

DICOTYLEDONOUS PLANTS.

Cruciferæ.

Stenopetalum velutinum, F. M., and *S. lineare*, R. Br.; both growing chiefly on hard loamy soil.

Pittosporeæ.

Pittosporum phillyroides, De Cand.

Sterculiaceæ.

Commerconia magnifolia, F. M., a perennial shrub, growing near the Ranges. *C. Kempeana*, F. M., grows only on sandhills.

Hannafordia Bissillii, F. M., perennial shrub, growing on the Ranges.

MALVACEÆ.

Hibiscus Sturtii, Hooker, only on rocky tracts. *H. Farragei*, F. M., in the bed of creeks.

Gossypium australe, F. M., on the Ranges; stem annual only here.

Abutilon otocarpum, F. M., and *A. cryptopetalum*, F. M., stems annual, growing everywhere.

Sida virgata, Hooker; *S. rhombifolia*, Linné.

Plagianthus glomeratus, Bentham; by springs only, stem annual.

URTICACEÆ.

Ficus platypoda, Cunningham, the native fig-tree; only on and near the Ranges.

SAPINDACEÆ.

Heterodendron oleifolia, F. M.; a very pretty tree, growing on rocks as well as on sandhills.

ZYGOPHYLLEÆ

Tribulus terrestris, Linné.

FRANKENIACEÆ.

Frankenia laevis, Linné; on hard stony ground.

AMARANTACEÆ.

Alternanthera nodiflora, R. Br.; *Achyranthes australis*, R. Br.; *Ptilotus alopecuroides*, F. M.; and *P. incanus*, Poiret; all growing everywhere:

SALSOLACEÆ.

Rhagodia nutans, R. Br.; *Chenopodium auricomum*, Lindley; *Kochia aphylla*, R. Br.; *K. lanosa*, Lindl.; *K. brevifolia*, R. Br.; *Chenolea sclerolaenoides*, F. M.; *Babbagia dipterocarpa*, F. M.; *Atriplex nummularium*, Lindl.; *A. velutinellum*, F. M.; *A. holocarpum*, F. M.; and *Salicornia leiostachya*, Benth. Most of these plants are good food for sheep; they grow even on the most arid places.

FICOIDEÆ.

Mollugo Cerviana, Ser.; a small annual, growing only after heavy rains.

POLYGONACEÆ.

Polygonum plebejum, R. Br., and *Muehlenbeckia Cunninghami*, F. M.

LEGUMINOSÆ.

Mirbelia semiseptosta, F. M.; on the Ranges. *M. oxyclada*, F. M.

Templetonia egena, Benth.; a perennial shrub.
Psoralea eriantha, Benth.; *Swainsonia phacoides*, Benth.
Erythrina vespertilio, Benth.; a large tree in the Ranges.
Acacia sentis, F. M.; *A. minutifolia*, F. M.; *A. Farnesiana*, Willd.; *A. aneura*, F. M.; *A. pyrifolia*, De Cand.; and *A. salicina*, Lindl.

HALORAGEÆ.

Myriophyllum verrucosum, Lindl.; only in water.

MYRTACEÆ.

Eucalyptus terminalis, F. M.; *E. tesselaris*, F. M.; and *E. rostrata*, Schl.

RHAMNACEÆ.

Ventilago viminalis, Hooker, and *Spyridium spatulatum*, R. Br., are perennial shrubs, the latter growing only in the Ranges.

CUCURBITACEÆ.

Cucumis acidis, Jacq.; *Mukia scabrella*, Arn.

STACKHOUSIACEÆ.

Stackhousia muricata, Lindl.

THYMELEÆ.

Pimelea microcephala, R. Br.; perennial shrub, growing only in shady places.

PROTEACEÆ.

Grevillea striata, R. Br.; a large tree attaining a height of 100 feet.

LORANTHACEÆ.

Loranthus Exocarpi, Behr.; *L. pendulus*, Sieber, *et var. canus*, F. M.; and *L. linophyllus*, Fenzl.

SANTALACEÆ.

Santalum acuminatum, A. De Cand.
Exocarpus spartea, R. Br.; a perennial shrub in the Ranges and on the sandhills.

RUBIACEÆ.

Pomax umbellata, Sol.

COMPOSITÆ.

Minuria Cunninghami, Benth.; *Calotis microcephala*, Benth.; *C. Kempei*, F. M.; *Polycalymma Stuartii*, Sond. and Muell.
Siegesbeckia orientalis, Linné.
Millotia Kempei, F. M.; a small annual growing on sandhills.

Helichrysum Kempei, F. M.; *Helipterum pterochætum*, Benth.; *H. moschatum*, Benth.; *H. Charsleyæ*, F. M.
Senecio odoratus, Hornem; *Bidens bipinnata*, Linné.

GOODENIACEÆ.

Goodenia cycloptera, R. Br.; *G. sepalosa*, F. M.; *G. Vilmoriniæ*, F. M. These lovely little plants grow here almost everywhere after a good rain.
Scævola depauperata, R. Br.

ASCLEPIADEÆ.

Marsdenia Leichhardtiana, F. M.; a creeping plant, the fruits of which are eaten by the aborigines.

SOLANACEÆ.

Solanum ferocissimum, Lindl.; *Datura Leichhardtiana*, F. M.
Duboisia Hopwoodii, F. M.; the leaves of this shrub are used by the natives to poison emus.

CONVOLVULACEÆ.

Convolvulus erubescens, Sims.

BORAGINEÆ.

Heliotropium pleiopetalum, F. M.; on sandhills.
H. undulatum, Vahl.

VERBENACEÆ.

Newcastlia spodiotricha, F. M.; on sandhills only.
Verbena macrostachya, F. M.; in the bed of creeks.
Spartothamnus teucriiflorus, F. M.
Clerodendrum floribundum, R. Br.

MYOPORINÆ.

Myoporum Cunninghami, Benth.; *Eremophila Mitchelli*. Benth.

MONOCOTYLEDONOUS PLANTS.

LILIACEÆ.

Thysanotus exiliflorus, F. M.; *Corynotheca lateriflora*, F. M.; on sandhills.

COMMELINEÆ.

Commelina ensifolia, R. Br.; under shrubs in shady places.

NAIADEÆ.

Naias major, Allioni.

TYPHACEÆ.

Typha angustifolia, Linné.

CYPERACEÆ.

Cyperus textilis, Thunb.; *Scirpus littoralis*, Schrad.; in moist ground.

GRAMINEÆ.

Panicum divaricatissimum, R. Br.; *P. Gilesii*, Benth.
P. distachyum, Linné; *P. decompositum*, R. Br.; *P. leucophæum*, Humboldt.
Setaria macrostachya, Kunth; *Spinifex paradoxus*, Benth.
Lappago racemosa, Willd; *Imperata arundinacea*, Cyr.
Andropogon laniger, Desf.; *A. sericeus*, R. Br.
Aristida stipoides, R. Br.; *A. calycina*, R. Br.; *A.ramosa*, R. Br.
Perotis rara, R. Br.
Chloris acicularis, Lindl.; *Eleusine digitata*, Spreng.
E. cruciata, Lam.; *Sporobolus Lindleyi*, Benth.
Phragmites Roxburghi, Kunth.; *Anthistiria ciliata*, L. fil.
Eragrostis Brownii, Kunth.; and *Eriochloa punctata*, Hamilton.

ACOTYLEDONOUS PLANT.

FILICES.

Cheilanthes tenuifolia, Swartz.

The result of my investigations, as far as numbers are concerned, is now as follows:—

	List 1.	List 2.	Total species.
1. Dicotyledoneæ	157	94	251
2. Monocotyledoneæ ...	4	30	34
3. Acotyledoneæ	1	1	2
Total	162	125	287

Observations about the Habits of some South Australian Ants.

By J. G. Otto Tepper, F.L.S., Corr. Memb.

[Read February 7, 1882.]

[Abridged.]

My own observations refer principally to the forming of new nests, though being only made haphazard, they are not entitled to the authoritative weight of Sir J. Lubbock's, yet they may probably furnish hints to others to clear up the question.

The first incident to be related as bearing on this point occurred when I was still a youth. While walking along the edge of a lagoon, where the water had thrown up small pieces of dead timber, bark, &c., which I turned up in the search for insects, I came across a small number of workers of the common brown Formica clinging to the under side of a piece of thick Eucalyptus bark that had evidently floated ashore in this position, being still within the reach of the larger wavelets. They occupied the only moderately dry spot, and had no female or eggs with them. Without intending any particular experiment, but meaning simply to give the castaways a chance of escape, I took the piece of bark up and placed it on the driest spot near. Such pieces of bark being capital traps for various species of Coleoptera it was visited consecutively at irregular periods, while the ants were regularly noticed. For some time they were content with the habitation with which chance had furnished them ; but gradually getting bolder and venturing more frequently forth for food, they found that they had no near neighbours, which indeed was the case, as an exceptionally high flood had destroyed all ants' nests for some distance the year before.

After some weeks, though, the beginning of the sinking of a shaft was noticed, and at some later visit all the ants had removed to their underground suite, of the growing dimensions of which the increasing height of the characteristic wall of pellets ejected from the shaft, and surrounding it, gave evidence. This shaft had been formed near the edge of the piece of bark so as to afford them shelter from sun and rain until perfectly established. For it must be mentioned that

these Formicæ (popularly termed the "sugar ants") only move about on cool, cloudy days and dry nights, when they sally forth forage hunting.

This nest was observed for years, and the ants seemed to increase, for on one occasion the *swarming* was observed, but I cannot remember especially noting whether *both* sexes were represented, and my observation is, therefore, somewhat inconclusive.

Sir J. Lubbock cites another observer who had succeeded in establishing a colony artificially, and mentions that he only succeeded in one or two instances out of many by introducing the strange queens at first only to a very few ants, and very gradually increasing their number. It may have been, therefore, in the above case that the small number of ants was an important factor in establishing the colony, inasmuch that they captured one or two stray queens, and elected to be their subjects instead of destroying them.

The "swarming" of ants takes place on warm sultry days, in the afternoons and early part of the evening, not frequently before the summer and autumn, and generally before rain. In the morning preceding it the ants are unusually active, the numbers crowding about the holes increasing as the day advances, till at last the winged males and females begin to appear, at first a few, but in a few minutes pouring out, mixed with the workers in a continual stream. Ascending stalks of grass, &c., all who can take to the air, forming occasionally clouds of insects, and occasionally rising to great heights, exceeding that of very tall Eucalypts, where they only can be distinguished collectively by means of the reflected sun rays, like a faint mist. While flying thus, mates meet, and copulation takes place, the pairs dropping helplessly to the ground, settle on one's clothes, or are carried along by the breeze and snapped up by the swallows. As soon as the act is completed, they cast their wings, and, if near a friendly nest, seek its shelter, to which they are conducted (sometimes assisted by dragging) by the active workers rushing excitedly about in myriads. Or, if not near, they seek some shelter under stones, bark, &c., or in hollows of the ground, where one often meets solitary ones, weakened by starvation, scarcely able to move. Strange to say, it seems that those who do not pair retain their wings for a lengthened period, as I have found solitary ones days after the swarming still with their wings and have kept some, captured at once, in boxes, and forgotten to be killed for the collection, that were afterwards found dead with the wings still firmly fixed, while pairs caught dropped them mostly immediately

On one occasion I came across a nest of the giant Myrmicidæ,

the black "Bulldog Ant." This was a rather formidable affair, owing to many hundreds of the large creatures (the females above an inch in length while alive) flitting about one's head, all armed with a sting about a quarter of an inch in length, while the shrubs near the nest were covered with scores of pairs and single ones. This took place on April 7, 1880, between ten and eleven o'clock a.m., and I learned here for the first time that the males differ so much in form from the more formidable and aggressive sex that till then they had been looked upon as belonging to a genus of wasps.

They are only from half to two-thirds the size of the females; are much more slender in build, and much more active; their heads are small in proportion, no larger, in fact, than those of certain species of wasps; have weak mandibles (the females and workers possessing very strong ones); and the first joints of the antennæ differ in no wise from the remainder; while the females and workers generally have a very long one at the base, thus producing the appearance of a break or knee-like bend. Though owning a sting, yet this is not long, and they do not employ it very readily.

Reverting to the forming of new colonies of ants, this can be observed easily with two species of ants very common and numerous in many parts of South Australia, viz., the purplish city-building Formica (about a quarter inch in length), and the small black ant (scarcely one-eighth inch), overrunning in countless numbers all dry localities, even cottages, especially where there are trees or shrubs and the grass not dense. Both act essentially in the same manner, but the habits and habitations of the larger species being more conspicuous, I select it for illustration. These ants belong apparently to the Formicidæ, but possess nevertheless a not quite despicable sting in addition to strong mandibles and a very excitable temper.

As localities for their habitations they prefer hard, dry, barren spots, in which they sink their circular and mostly perpendicular shafts, a number of which being situated in close proximity, the distance between them being from three to fifteen inches, varying according to the strength and age of the nest. The ejected grains of gravel and pellets of clay, &c., are placed on the waste ground around and between the holes, get solidified by alternate wetting and drying, and gradually attain very respectable dimensions. One of the largest seen measured about a yard in perpendicular height, and some two or three across, the heap being chiefly composed of ferruginous pebbles from a pin's head and upwards in size, and containing more than a score of shafts. Generally, though, they are only a few inches high in the centre, and where not protected by surrounding shrubs no materials collect, the wind removing

them as fast as deposited. Yet this does not at all incommode the little worker, or interfere with the increase of population, for I have seen colonies up to ten yards in length and one or two wide on barren roads and even garden walks, prospering exceedingly. Their time of greatest activity in the hot season is the morning and evening, each community having its own district, to the more distant parts of which regular beaten tracks lead, real roads very well defined near the towns, being between one and two inches wide, and trodden out by their own tiny feet, and by their motion kept clear of grass and other obstacles. At varying distances these "roads" become less and less marked by giving off ramifications to trees and shrubs, and finally disappear altogether. Near human habitation their bold, prying, and aggressive habits are apt to become disagreeable, and it was an experience of this kind that led me to notice how nests were formed *de novo*.

Some 50 or 60 yards from my residence, on an old track, was one of these towns. Between it and the former the children used to play, and frequently to consume their luncheon, when, of course, the scattered fragments were left behind. There the ants discovered them and carried them off to their stronghold. After a short time, the sinking of a shaft was commenced at the very spot, which happened to be within some ten yards from the house, and this was quickly succeeded by others, a new colony being thus established. Between it and the parent-nest a continual connection was kept up by a continuous double stream of ants travelling in the one beaten track. On this track again, solitary holes occurred, like hotels on a main road. From the new centre the ants extended their excursions even into the cottage, and, at last, commenced mining operations in front of the door, when I had to interfere in earnest to prevent it. The above facts point to the conclusion that in the selection of a new locality for a nest the ants are guided by the proximity of a copious supply of food as one of the determining causes.

Those ants who are somewhat lazy, &c., construct at first a temporary home, saving themselves from a hurried run should a shower of rain threaten, &c. At the time of swarming, no doubt some of the fertilised females find their way into it, lay their eggs, and thus convert the temporary into a fixed place of abode. If we consider that in the course of the long years these nests remain in existence the localities of the most copious sources of food must change by the decay and growth of shrubs, trees, &c., it is easily seen that the establishment of new settlements will occur in various directions, but without breaking their connection for a long time, thus forming districts over which the ants are all friendly, and find shelter in

each other's homes. This also will prevent too close interbreeding, the females of all parts of such a district being scattered *ad libitum*, but eagerly preserved by the workers, as being possessed of the same "scent," while those bred from nests originating from a different centre, or the connection of which had been severed by some cause or other for a very considerable period, are destroyed, as Sir J. Lubbock's experiments prove.

When the interests of two hostile districts (*i.e.*, such without previous connection) interfere with each other war ensues, and is kept up for days and nights, if dry weather prevails, with an outrageous determination and cruelty. Thousands of ants may then be seen in groups of two, three, or more, trying which can disable the other first, the dead bodies, with the crippled ones who have lost more limbs than necessary to move with, lining both sides of the track along which the slaughter proceeds. The latter appears only to cease with the utter exhaustion of one of the parties or a heavy continuous rain. Battles like the one described seem to take place but rarely, as I have but three or four times met with them during many years' observation of insects.

The small "Black Ants" do not form "cities," but each nest has only one, rarely two, entrances, surrounded by a conical dyke of ejected pellets, or are quite unprotected. They avail themselves of hollow spaces under stones and in walls—even those under bark or in rotten wood are not despised. But they likewise have roads or tracks, along which they pass through the grass, and in the course of which occasionally new shafts are sunk, thus exhibiting the same manner of operations as the larger species.

DESCRIPTIONS OF SOME
RARE NEW SOUTH AUSTRALIAN LEPIDOPTERA.

By J. G. O. TEPPER, F.L.S., Corr. Memb.

[Read April 4, 1882.]

Smerinthus (?) Wayii, *spec. nov.*

This rather large moth was captured in the evening of February 15th, 1882. Being attracted by the light of the lamp, it entered my room, making its presence known by the very loud surring noise of its darting, erratic flight, peculiar to *Sphingidæ*.

Examining it closely one finds that it unites affinities belonging to widely different families—thus, the form of its body conical, smooth, and ending in a point; the small head and eyes; large, hairy, and jointed palpi; and the moderately-long spiral tongue; also the general form of the anterior wings, together with its habit of flight, relate it to genus *Smerinthus*, of the *Sphingidæ;* while the long thin antennæ (though in other respects like those of *Smerinthus*), and the great width (and length) of the posterior wings place it in relation to the family of *Oecneria*, some of which, like *O. monacha*, likewise show the peculiar form of the abdomen. Finally, the coloration of this moth is that common to *Geometridæ*, from which it differs in most other points, notable the very heavy body.

Only one specimen has as yet been seen, thus nothing is known about its habits or transformation.

Considering, under the circumstances stated, that this moth is new, I beg leave to name it after His Honor the Chief Justice, and distinguished President of the Royal Society of South Australia, who so assiduously promotes and patronises science in our province.

DESCRIPTION.—Head small, same colour as body, &c. Eyes not large, blackish, with silvery lustre. Antennæ thin, pointed, about half the length of body; silvery white; fringe bristles minute, greyish-ochre. Wings strong, proportionally wide; when at rest extended, but obliquely elevated; colour light ochreous-brown, irregularly sprinkled with minute blackish dots; a straight, narrow brown bar extends from near the extremity of anterior wings diagonally to near the middle of interior margin, thence extending across the posterior wings to the middle of their interior margin; another, less distinct, curved band, concave towards base, crosses anterior wings

half-way between base and the long bar measured along middle of wing. A small silvery white lunar spot with black edge is situated between the two bars and crossed by the fourth rib; a similar one, but smaller still, and close to the bar, occurs between the third and fourth rib on the posterior wing. The underside of both pairs of wings is similarly coloured, but paler, with the lunar spots, but without the bars; the ribs are but faintly visible, and of lighter tint than the rest. The anterior margin of first pair is strong and very straight, the extremity forming a sharp projection where joining the outer margin, which is distinctly scolloped, but scarcely fringed; the interior margin is subconvex, the basal part thickly fringed. The anterior margin of posterior pair is convex, and somewhat longer than the inner, which is straight; the outer margin is rounded and lightly scolloped; the wings extend nearly to end of abdomen.

The body is of the same colour as the wings; the thorax is covered above with long hair; the abdomen is conical, quite smooth, the scales being very small and adherent, and terminating in an attenuated point. The legs are weak, bare, smooth; colour a light silvery ochreous tint, covered with numerous minute, black dots; femurs of fore legs almost cylindrical; those of middle pair with two, and the hind legs with four spurs. Only one specimen seen.

	Inches.
Length of body	$1\frac{1}{8}$
Span of wings	$2\frac{7}{8}$
Diameter of thorax	$\frac{1}{4}$

Lithosia rubratra, *spec. nov.*

This is one of the few gaudy-coloured moths of South Australia, which are so rare here. Three specimens—one male and two females—were captured; the first in a wooded gully near Cherry Gardens on November 9th, 1881, late in the afternoon; the others a few days later near the Almanda Mine, Scott's Creek. Its flight is weak and slow, more a fluttering, and of short duration; when resting (which they do on dead branches, especially on such as have been blackened by fire, or covered with lichens) they fold the wings, like some Tineadæ, but do not roll them. Not being aware of any previous description, I beg to attach to it the name *Lithosia rubratra* (the red and black Lithosia) provisionally, as its general appearance agrees best with that genus.

Description.—Rather small; colour bright red or crimson and black. The basal half of both pairs of wings, as well as a narrow band and fringe along their outer margins, is bright red or crimson; also the head, collar and the last segment of the abdomen; the remainder is black, this tint forming a broad

bar across the distal end of the wings. The under side is similarly coloured, but somewhat paler, the posterior ones showing some yellowish streaks amongst the red. The posterior part of thorax and the two first abdominal segments (much wider than the others) are brownish. The legs are unequal in length, the first pair being only about half as long as the last; the middle pair being intermediate. The two first pairs of legs are wholly black; the former of the last is dark red, and the foot-joints tinged with the same. Spurs are absent from the front legs; the median pair has one, and the hind legs have two near the middle and one at the end of the femur. Claws are very minute or absent. Antennæ two-thirds of length of body; sealed on upper and inner margin of the eyes; compressed; the basal joint large, sub-globular; other joints minute, numerous; furnished with short setæ. The female is a little larger and brighter coloured than the male. Length of body three-eighths to half inch; span of wing, $1\frac{3}{16}$ to $1\frac{5}{16}$ inch.

Thryphæna (?) tineæformis, *spec. nov.*

This day-flying moth is, in the whole, not so rare as the foregoing Lepidoptera, it being found in moderate numbers in the Tertiary scrubs, and coming sometimes in the early parts of sultry evening into the room, being attracted, like many others, to the light. The above provisional name has been adopted to denote that, though the very marked coloration, &c., is that distinctive of the genus *Thryphæna* (Family Agrotidae) yet the slender legs and long palpi establish relationship with the *Tineadæ*.

Description.—Colour brown, orange, and black. Body rather slender, somewhat compressed conical. Anterior wings rather narrow, triangular; colour brown; a broad whitish indistinct bar near its extremity; a larger and a smaller black spot on first rib near middle, reproduced on the under side; the latter light yellow, except frontal margin, tip and outer margin, which are light blackish brown, with a narrow light band along the latter. Posterior wings orange yellow; a broad black band from upper angle to last rib; but one underside light yellow; band reproduced but fainter; fringe narrow, light yellowish. Body light brown above, silvery white below; legs white, very long and thin; forelegs with one pair of spurs; middle and hind legs with two very unequal pairs; one spur of each being very long, the other minute. Head projecting, neck long; these and the thorax dark brown; eyes large, projecting, black; antennæ long, slender; palpi long, slender, brown. The female is a little larger and brighter-coloured than the male.

Length of body—$\frac{1}{2}$in. to $\frac{5}{8}$in. Span of wings—$1\frac{1}{4}$ to $1\frac{3}{8}$ in.
Locality—Clarendon.

Notes on some South Australian Lizards.

By J. G. Otto Tepper, F.L.S., Corr. Memb.

[Read May 2, 1882.]

In the course of the last week of December, 1881, two rare and remarkable lizards were handed to me by Mr. Bilney, Kangarilla, who caught them in the Tertiary scrub adjoining that township.

Turning to Gray's "Lizards of Australia," 1867, it is easy to see that one is a very near relation to *Hinulia Gerrardi*, from Rockhampton, Queensland; but neither the coloring nor the proportion of the various parts of the figure agree with the specimen. The transverse bands are much more dissimilar, some from the one side not meeting those from the other at all in the middle of the back, while there are short but very distinct rudiments of bars between the principal ones, which are scarcely indicated in Gray's figure by adventitious light markings.

Then, again, the figure of *H. Gerrardi* shows thirteen light transverse bars from the base of the tail to its tip, while the Kangarilla specimen presents only five or six distinct ones and one or two faint ones. Another difference is seen in the much shorter tail in proportion to the body.

When caught from under the rocks it was very lively, and exerted itself much for a day or two to escape, even snapping at the hand, but it soon became quiet, taking raw and cooked meat freely from between one's fingers. The example is unique.

Another species of the genus *Hinulia Greyii* in Gray's work (plate 10), which is recorded by him from Swan River, has lately been noticed by me living, seemingly in pairs, under rocks, close to the river Onkaparinga. My specimens appear to be somewhat larger than the one figured by Gray, but in other respects there seems to be no difference.

The third species is one of the snake-like lizards, which are considered and treated by most people as snakes. It is a *Pygopus*, the genus being easily distinguished by the large plates of the head and the flapper-like rudiments of the hind legs at the base of the tail, and was taken from a small hole in sand by the same person who captured, in the same locality, the large *Hinulia*.

The specimen differs very much in detail from *Pygopus*

squamiceps, as figured by Gray (plate 8, fig. 3). The first frontal plate, which is whole in the figure, is divided in two in my specimen. The body of the latter is much wider than the head, increasing gradually in width till within a short distance from the base of the tail. The tail is somewhat abruptly joined to the body, and is almost as long as it. The body of *Pygopus squamiceps* is scarcely half as long as that of my example, but is thicker in proportion. The only markings are some minute black dots along the sides of the body, while my specimen presents five conspicuous black marks on the posterior part of the head. The largest one is on the middle line of the body, oblong, with an anterior stalk-like projection; on each side, but farther forward, is a smaller but similar spot, the "stalk" pointing to the upper angle of the eye; in a line with them are two others, but bar-like, one on each side, commencing opposite the hindmost extremity of the central spot and extending diagonally backwards and upwards. The length of the central spot and these bars is about one-fourth of an inch; that of anterior ones one-eigthth of an inch. I cannot discern any dark spots along the sides of the body, but they are distinctly visible from the base to near the tip of the tail at irregular distances, and bordered with white on the lower side. The last inch or so of the tail is covered with very much smaller scales, which are of a yellowish-grey tint, and are marked with short longitudinal lines. The tip of the tail is very thin for about three-sixteenths of an inch, and not hard. The general color is a clear ashy grey above and light grey, tinged with pink, below.

Should this specimen prove to be new, the name *Pygopus longicaudatus* might be suggested as appropriate.

Several examples of *Pygopus squamiceps* have been brought to me that were captured under rocks on the hillsides about Ardrossan, Yorke's Peninsula.

List of Diurnal Lepidoptera about Balhannah, Co. Adelaide,

WITH DESCRIPTIONS OF NEW OR LITTLE-KNOWN SPECIES.

By E. Guest, Local Correspondent.

[Read May 2, 1882.]

Considering the acknowledged paucity of South Australian Papilionidæ, this locality must be reckoned a fairly good one for this family, as I have collected fifteen species in three years. These and two species known to exist, but not in my cabinet, make a total of seventeen species for this very limited area of about three miles radius. A species of Synemon occurs, but I do not consider it a butterfly.

1.—Pieris Aganippe.

This is not very common, especially the male. I believe it is generally considered double-brooded, but in this locality at any rate I am almost sure this is not the case. The eggs are lain in the spring, and the imago emerges early in autumn, which is the only time when I have ever seen the male. The female passes the winter in some secure spot, and is seen commonly in early spring, but they pair in the autumn, and the male seldom or never survives.

2.—Terias smilax.

Common some years in October; entirely absent in others. It is sometimes—but I think abnormally—double-brooded, as I have more than once seen single specimens in March.

3.—Pyrameis itea.

Not uncommon most years in October, but I am uncertain whether there is one brood or two. It flies in the autumn, and some at least of the females pass the winter in hollow trees, &c., where I have found them in August.

4.—Pyrameis cardui.

Very abundant. The same remarks apply to this species as to *P. itea.*

5.—Juno velleda.

Very abundant. Flies all the year round except in depth of winter, when it hides away like the two preceding insects. I

think, however, there is no doubt of there being two broods of this species per annum.

6. { Lasiomata atlanta.
   { Xenica Klugii.

This insect is very common, but here, at any rate, there is certainly only one brood, and I have never seen a single specimen in the autumn. The two sexes are almost exactly alike.

7. { Lasiomata merope.
   { Heteronympha merope.

The sexes vary so much as to appear at first sight to belong to entirely distinct species. It is as common as *L. atlanta*. The males appear about ten days before the females, and are almost exactly like *P. atlanta*, though nearly double the size.

8.—Lasiomata ocrea, *spec. nov.*

This insect appears to be undescribed, and is so named in allusion to a very peculiar marking, like a Hessian boot, on the underside of the wing. It is very rare; I have taken only one specimen, which is, I believe, a female, but Dr. Gaze had, however, previously captured two specimens.

The following is a short description:—

Expanse of wing, two inches. General colour of all the wings, yellowish cinnamon. The apical half of the fore-wing is crossed obliquely by four interrupted black bars, in the centre of each of which is a round black spot with a white eye. The hind wing has a dull round black spot on the costa, and a white one near the centre of the wing, surrounded by a very narrow black line. The underside of the fore-wings is a reproduction of the upper side. The ground colour of the hind wings is nearly white, and there are two jet-black spots with white centres; there are also several dull, blackish-brown smears, and about the centre the large and curious boot-like mark mentioned above. The antennæ are rather short and excessively fine. Body very short.

I now come to the Lycænidæ, of which I have six species included in the genera *Lycæna* and *Cupido*. Unfortunately, however, the descriptions in Mr. Tepper's paper, Trans. Roy. Soc., S.A., Vol. iv., are so short (where, in fact, they are described at all), and the plates illustrating only the top side of the wing, that I cannot with certainty identify all my species.

9.—Cupido Bœtica.

It is very common, flies very fast, and is double-brooded. But is it correctly named?

10.—C. agricola.

This insect I believe I have also, but it is not common here.

11.—C. adamapuncta.

This is another insect that I think I can recognise, but Mr. Tepper appears to have only the female. The male is exactly the same size, but of a beautiful rich plum colour.

I once found both sexes of this swarming in extraordinary numbers round the white flowers of a shrub called here the box tree. This was in January; but I have on two or three occasions taken the female sitting half asleep on grass-stems in May. It evidently hybernates, and is seen in a tattered state in October.

The other species of this family in my collection I cannot at all identify from either the plates or diagnoses of Mr. Tepper. I have, I think, two species of Lycæna, and one of Cupido, that do not agree with any of his.

12.—Cupido molybdena, *spec. nov.*

It bears a distant resemblance to *C. fasciola*, Tepper, but the markings do not agree, and the male, though smaller, is much *lighter* coloured than the female; the superior surface of the wings of the female being of a very dark burnt amber brown, with a white fringe interrupted with dark brown spots. The under sides of the wings agree pretty fairly with those of *C. fasciola.*

13.—Lycæna pervulgatus, *spec. nov.*

Strange to say, this is the very commonest insect we have. There are at least *three* broods of it, and it may be taken all the year round, even in the depth of winter if the sun should shine out warm for two or three days together. It approaches nearest to *Cupido delicatus*, Tepper, but there is no sign of the appendage or black spot in either sex, otherwise in size and colour it agrees pretty well. I possess also what I suppose to be a dwarf summer brood of this, for I can see no specific difference, that is only three-fourths of an inch across the wing.

14.—L. paradoxa, *spec. nov.*

This is a very singular insect, but unfortunately very rare; size, 1¼ inch. Both sexes nearly alike. Colour, rich bronze, shot with plum colour; this last rather more *prenoncée* in the male. There are no spots or markings of any kind, excepting that the wing rays are yellowish brown. Fringe, bluish white. Underneath, the entire surface of both wings is shiny white, with the least possible tinge of blue, without markings of any kind, excepting a row of very minute jet black specks along and close to the outer margin of both wings. Body and thorax coloured both above and below, the same as the wings.

15.—Hesperilla fumosa, *spec. nov.*

It approaches nearest to *H. gracilis*, Tepper, but can be distinguished at a glance at the underside, the lower wing having a broad, chalky, white band across the centre, with one white spot above it and no other markings. It is not uncommon; is double brooded, and appears to be particularly fond of the flowers of the *stinkwort*, almost the only insect I know of that is.

16.—Synemon læta.

This is pretty common most years, but local. Its short rapid flight and mode of settling with its hind wings hidden by the top ones, put me in mind of a *Noctua* rather than a butterfly, in spite of the clubbed antennæ.

On the Propagation of Cymodocea Antarctica.

By Prof. P. Ascherson, Berlin.

Translated and communicated by J. G. O. Tepper, F.L.S., Corr. Memb.

[Read June 13, 1882.]

When residing at Ardrossan, on the eastern coast of Yorke's Peninsula, Baron F. von Mueller, K.C.M.G., &c., the illustrious Government Botanist of Victoria, requested me to pay special attention to the above plant in order to obtain flowering and fruiting specimens. This was done accordingly, as far as my other duties permitted, and the observations made were recorded in two short papers published in Vol. IV. of the Transactions of this Society. The separate prints were subsequently forwarded with a number of specimens to Dr. P. Ascherson, Professor of Botany in the Berlin University, who did me the honour to reply by a lengthy letter, expounding his views in the matter under consideration. As this is of general interest in regard to botany, I beg to place a translation of this communication before the Royal Society, as far as relating to the subject. It will be seen that, though my observed facts were correct, the explanation (through insufficiency of the means of critical examination) was not so. (J. G. O. T.)

"Berlin, April 3, 1882.

"Dear Sir—For your interesting remittances of the 4th February last, I render you my sincerest thanks in the name of the Botanical Society and in my own.

"Your two papers upon the habits of the Cymodocea antarctica have interested me in a high degree; the riddle, which has occupied me for half a generation (more accurately, since 1867), is in its main points solved by your admirable observations.

"As far as I could, I critically examined the material kindly sent me by you. I find your statements of the facts and the illustrations of the same confirmed.

"I cannot, however, entirely agree with your explanation of the same. According to my opinion the whole process is to be looked upon as 'vegetative rejuvenescency.' This expression of the late eminent morphologist and biologist, A. Braun, my ever-memorable teacher, suits in this case most fitly the nature of it. The sexual organs you have not observed, and just this prolific rejuvenesce is qualified to explain their excessive rarity. The 'male organs' are most likely animal inhabitants of the plant, which may probably be specifically determinable. Also in the 'fruits' I can find nothing of the organs of a pistillate blossom, seeds, &c. The male flower is figured by Gaudichaud, consisting of two stamens, joined together longitudinally, borne upon a long stalk, and enveloped in leafy foliage, the sheathing of which they probably little surmount. Each partition of the stamina is surmounted by separate spikelets.

"The structure of the female flowers appears, by the only specimen submitted to me by Baron F. von Mueller, not to differ much from that of the other species. They also consist of two adjacent free carpels, each surmounted by two long ribbon-like stigmata (or pistils). The fruit of those species of *Cymodocea* that is known in the locality of their own home—viz., *C. nodosa*, *rotundata*, *isoetifolia*, *manatoram*—is always strongly compressed, and about half-circularly round, furnished with a hard 'bony' shell, which splits along the margin when germinating.

"The development of the processes you have observed, I imagine to take place in about the following manner:—About the present time—therefore in your autumn—an organ is formed at the apex of a leafy branchlet, recognisable at once by its turning in a right angle to the previous position of the leaves. The same, must in consequence of being concealed in the preceding foliage, not be easy to detect, although the lowest leaf of this bud (from which the 'horny cup' originates) may betray itself to the touch. This

lowest leaf, which also is the first that crosses the preceding ones, is presumably four-celled from the commencement. The arrangements of structure, promiscuously mentioned by you, of the narrower and wider partitions render it somewhat improbable for four, or two, separate organs, while presenting no difficulty if viewed as parts of a single leaf. Your 'remains of seed' is, according to my idea, nothing but the rudiment of the internode preceding the 'germ leaf,' as I shall call the organ; the 'lid of the ovary,' probably but the point of disjointure, by whose death the young plant becomes free. The 'floral scale' is very probably but a first lamina, and perhaps also the succeeding one, which certainly leaves horny remains. How the following ones are circumstanced, which have already dropped off the young plants, cannot be made out from the material submitted; probably they are leaf-like, though smaller than their successors. A similar process occurs in the formation of the fruit of a water plant appertaining to the old world, *Trapa natans*. The fruit of this plant is built up of four calyx cells; along the midrib horny spikes become free through decay of the external coverings, which remind one of the arrow-barbs of savage tribes, and most likely also bring about the anchoring of the fruit in the soft mud.

"In respect of the rooting process, I had formed a similar idea a year ago, agreeing closely with the facts observed by you, as you would see from my letter to Baron F. von Mueller.

. . . . . .

"In the words you were good enough to cite from my former letter an error is to be corrected, which has been doubtlessly produced by my handwriting. You believed, no doubt influenced by your explanation of the process, that I also speak of a *pistil* (German—Stempel; see note), while, in my case I must have written STEM (German—Stengel)."

NOTE BY MR. TEPPER.—The contrary is the case, as I had formed no explanation till I found in the expression stated what I considered a key to the structure, but which now turns out to have been a misapprehension occasioned by the learned professor's handwriting, which is sometimes difficult to read by one not very familiar with it.

Notes on the Tertiary Strata beneath Adelaide.

By Professor Ralph Tate, Assoc. Lin. Soc., F.G.S., Corr. Memb. Acad. Sc., Phil.; Roy. Soc., Tasm.; Lin. Soc., N.S.W., &c.

Plate I.

[Read June 13, 1882.]

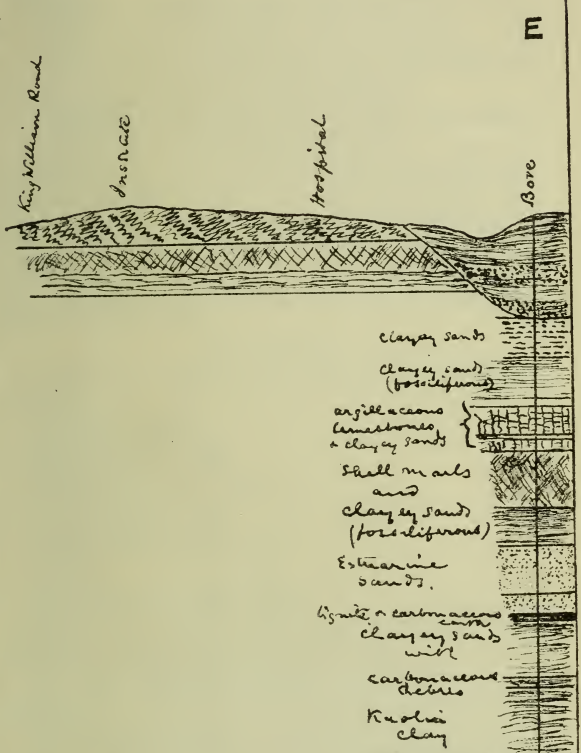
Hitherto the knowledge of the existence of Miocene strata beneath the City of Adelaide was limited to a small exposure of fossiliferous sandstone in the quarry at the rear of the Government Domain and to shallow well-sinkings, which for the most part do not penetrate the uppermost fossiliferous bed just mentioned.

Towards the end of last year the Hydraulic Engineer commenced a boring in the Waterworks Yard at Kent Town with the view simply of putting the machine on its trial, and to afford persons interested in the application of the diamond drill to the search for subterranean water the opportunity of seeing it in action. By request, I periodically visited the work, and reported on the progress of the boring, which was brought to a close after penetration to a depth of 411 feet, 360 feet of which was in Tertiary strata, and the remainder in the underlying fundamental rocks. The extracted cores range from eight and a-half to six inches in diameter. These reveal so interesting and complete a section of the Older Tertiaries that it seems desirable to record the stratigraphical succession in full; but as the boring section does not commence with youngest member of our Marine Miocene, I have incorporated in the section on Plate I. the strata exposed in recent drainage works, and in the quarry section (now concealed) at the rear of the Government Domain, which fill up the hiatus. Indeed, over the site of the bore-hole a considerable thickness of the Older Tertiaries has been denuded, and its place occupied with Pliocene drifts.

The horizontal section, Plate I., represents the grade from King William-road along North-terrace to the Kent Town Waterworks Yard. The western end of the section gives the stratigraphical succession supplied by the drainage works and the quarry; the eastern end, that of the vertical section, determined from an examination of the bore-cores.

Plate 1.

Section of Tertiary Strata beneath Adelaide



Vertical scale 1 inch to 100 ft.
Horizontal scale 4 inches to 1 mile

R. Tate delt.

The combined section agrees in general features with that of the coast cliffs of Aldinga Bay (for notice of which, see Trans. of this Society, vol. i., p. 121, 1878). The series of the Older Tertiary strata in the Adelaide basin may be summarised as follows:—

A. Estuarine or Lacustrine clay, exceeding 50 feet.
B. Marine—total thickness, 197 feet.
  (*a*) Calciferous sandstones, with oyster banks.
  (*b*) Sandy and calcareous clays, with argillaceous limestones, chiefly in the lower part.
  (*c*) Glauconitic limestones and sands, &c.
C. Lacustrine and Estuarine clays and sands, with carbonaceous debris—total thickness, 142 feet.

Series *a* at the Government-House quarry has yielded very few species of fossils in a state for critical determination, as with the exception of oysters and pectens, their tests have been removed. Nevertheless, these beds are on the same palæontological horizon as similar rocks forming the uppermost fossiliferous strata in the Aldinga and R. Murray Cliffs, which I have elsewhere (Trans. of this Soc., vol. I., p. 121, and vol. II., p. liii., et seq.) named the Upper Aldinga Series and the Upper Murravin Series respectively.

List of Species.

Nautilus sp.: related to *N. pompilius*, but of large proportions.
Cassis textilis, *Tate.*
Haliotis sp.; Bulla sp.
Ostrea cf. edulis, *Linné.*
Pecten spondyloides, *Tate.*
Pecten asperrimus, *Lamarck*, var.
Pecten subbifrons, *Tate.*
Nucula tumida, *Woods.*
Pectunculus McCoyi, *Johnston.*
Cardium.
Placotrochus deltoideus, *Duncan.*

Series *b* corresponds with the Middle Aldinga Beds, which form the main mass of Blanche Point Cliff. As in both, *Turritella Aldingæ* occurs in great profusion.

Not many fossils have yet been extracted from the bore-cores, so that a palæontological analysis of series *b* and *c* is postponed.

The glauconitic limestone which forms the base of the fossiliferous series at Aldinga differs lithologically somewhat from its probable equivalents in the Adelaide section, and the rarity in the latter of echinoderms and palliobranchs is another point of dissimilarity.

Beneath the glauconitic limestone at Blanche Point, Aldinga Bay, there is an unfossiliferous iron-shot sand of unknown thickness, but which to the north of Blanche Point gradually rises in the section until it attains a level above that of the Upper Aldinga Series, and is seen reposing, at a considerable inclination, against the old slate rocks. It is doubtlessly coeval with lignitiferous clay and sands in the Adelaide Basin.

Section of the Strata Penetrated by Borehole, Kent Town Waterworks Yard. Level of Surface—138.83 feet above Low Water Mark.

No.	Description of Strata.	Thickness in Feet.
1.	Soil, &c.	2
	Pliocene Drift.	
2.	Red clayey loam	28
3.	Fine waterworn gravel	8
4.	Grey pipe-clay, intermixed with sand	2
5.	Subangular gravel, to one-fourth inch gauge ...	5
6.	Grey pipe-clay, intermixed with sand	4
7.	Sharp sand and small gravel	2
8.	Grey pipe-clay intermixed with sand	1
9.	Fine yellow sand, somewhat clayey	3
10.	Grey pipe-clay, intermixed with sand	1
11.	Sharp sand	3
12.	Very sharp white quartz sand, of large dimensions, intermixed with subangular quartzite gravel to 1½ inch gauge. Water	10
	Miocene (Marine).	
13.	Greenish-grey clayey sand and sandy clay ...	11
14.	Grey and reddish mottled clay	14
15.	Fine clayey sand	3
16.	Black clayey sand (fossiliferous)	25
17.	Lighter-coloured and more sandy than No. 16, with thin bands of sharp white quartz sand, which are slightly inclined to the horizontal	5
18.	Light blue calcareous clay, graduating into ...	4
19.	Blue argillaceous limestone (fossiliferous) ...	16
20.	Black, clayey, calcareous sand	3
21.	Black, argillaceous limestone with glauconitic grains. Very fossiliferous	5
22.	Grey shelly marls, with glauconite, varying to compact limestone	30
23.	Sandy and shelly marls	10
24.	Brown and green clayey sands. Very fossiliferous	23

Miocene ? (Estuarine and Lacustrine).

25.	Very find grey sand	34
26.	Very fine grey sand with carbonaceous *debris*, containing water-worn pebbles and rolled fragments of shell of species occurring in No. 24	12
27.	Lignite mixed with fine mud	2
28.	White pipe-clay with lignite fragments and nests of iron pyrites	14
29.	Brown argillaceous earth mixed with carbonaceous matter and nests of iron pyrites	13
30.	White pipe clay with lignite	9
31.	Fine sand. Water	3
32.	Kaolin clay, mixed with sand in the upper part, and sharp quartz grit in the lower	55

Pre-Silurian.

33.	Decomposing felspathic quartzite	11
34.	Decomposed slaty rock, quartz vein }	
35.	Decomposed felspathic rock, quartz vein } ...	16
36.	Felspathose-quartzite gritstone	24
37.	Thinly bedded fine-grained sandstone with talcose-slate partings	—
		411

Summary.

Recent surface accumulations	2
Pliocene loams, gravels, and clays... ...	67
Marine Miocene	149
Lacustrine Miocene	142
Pre-Silurian	51
Total	411 feet.

Water was tapped in stratum No. 12 ; it was very salt, and rose to a height of 43 feet in the borehole.

Bed No. 12 I have regarded as the basal member of the Newer Tertiary series, because of its angular gravel, and that the underlying clayey sands, though unfossiliferous, insensibly graduate into others of undoubted Miocene age.

A fair supply water was also obtained in Bed No. 31, it yielded 117.4 grains of solid matter to the gallon. To the taste it was sweetish and slightly saline.

The chief ingredients determined were:—

$CaCO_3$ 5·2, $MgCO_3$ 1.3, NaCl, &c., 110·9.

Diagnoses of New Species of Miocene Fossils from South Australia.

By Professor R. Tate.

[Read June 13, 1882.]

Pecten subbifrons, *spec. nov.*

An equivalve, somewhat flattish shell, having the general form of the recent *P. bifrons*, and with the same shagreen-like sculpture; but from which it differs in its compressed and truncated ribs. The ribs are about twelve in number, with one or two longitudinal furrows and small tubercles; one or two slender ribs in the flat interstitial spaces.

Locality and Horizon.—In the calciferous sandstones, Adelaide.

Pecten asperrimus, *Lamarck*, var?

A very common pecten in the Upper Aldinga series and its equivalents, I refer with some doubt to the Lamarckian species, *P. asperrimus*, of our waters, which has been subsequently named by Sowerby, and better known as *P. australis.*

The chief differences are printed in italics in the following brief characters:—

Ribs, 24 to 26, flanked on each side by *two* or *three* secondary ribs, *with* or without *one rib in the furrow;* all the ribs with imbricating sub-erect scales or lamellæ. Ears *rather larger* than in recent examples. Largest examples much exceeding recent individuals.

Locality and Horizon.—Upper Aldinga series at Adelaide, Hallett's Cove, and Aldinga; Edithburgh, Yorke's Peninsula.

Pecten spondyloides, *spec. nov.*

Shell equivalve, equilateral, inflated, about as long as broad, covered with numerous compressed spiniferous ribs; the spines are of the nature of compressed imbricating squamæ. There are usually from seven to nine primary ribs, two or three secondaries and a variable number of tertiaries between each pair of primary ribs, all similarly ornamented, the dimensions of the spines varying with the size of the ribs.

Front margin of valves curved or slightly crenulated, not at all angular.

Ears equal, of moderate size, truncated; there is no byssal sinus.

Dimensions of a largish specimen, length and breadth, three and a-half inches; a large spine of the same, one inch.

Locality and Horizon.—Upper Alding series at Adelaide, Hallett's Cove, and Aldinga.

This very handsome shell has much the appearance of a *Spondylus*, to which genus I had referred it until I succeeded in obtaining a specimen with a perfect umbonal region. The test in the umbonal region is very thin, and often destroyed, otherwise it is fairly thick; and as the matrix is very hard, it is impossible to work out the hinge.

Cassis textilis, *spec. nov.*

Shell ovate, ventricose, whorls seven, varices at successive intervals of about two-thirds of a whorl. Surface ornamented with numerous longitudinal threads crossed by folds of growth. Last whorl bearing on the superior angle a row of (9-10) nodular tubercles, and on the medial portions two others equidistantly placed, the tubercles of which are smaller, much more so are those of the third row. Spire short conic. Columellar callus dentate; outer lip thickened, margin plain; columella very tortuous beneath the callus, canal recurved.

Dimensions.—Total length, 45; breadth, 32; thickness, 29; length of aperture, 31 millimetres.

This fossil bears much resemblance to *C. fimbriatus* of South Australian waters, but differs from it in being more ventricose with a much shorter aperture, in the spiral ornamentation, and in possessing three rows of tubercles.

Locality and Horizon.—The type is from the gastropod-bed beneath the oyster banks of the Upper Murravian, near Morgan, on the River Murray. Casts of much larger size, which may reasonably be referred to *C. textilis*, occur in the Upper Aldinga series at Aldinga, Adelaide, and the Bunda cliffs of the Great Australian Bight; also in the craggy limestones at Mannum, on the River Murray.

Turritella Aldingæ, *spec. nov.*

Shell acutely pyramidal, a little more than three times as long as broad, with three prominent ribs. Whorls about 20 in a length of 35 millimetres, subangular or flattish, separated by a moderately-impressed suture. Base flattened, ornamented with many spiral, unequal-sized threads, which are crossed by very fine radial striæ. Aperture subquadrate, margins united by a thick callus, which extends over much of the base; outer lip deeply and broadly sinuated.

The ornament on the whorls varies much in different specimens as well as in different parts of the same shell.

The medium prominent rib is generally granulose; the posterior rib is bisulcated, or not infrequently replaced by two

or three strong threads ; the interspaces between the ribs and adjacent to the sutures are ornamented with a few spiral threads crossed by curved lines of growth. On the anterior whorls of large examples there are about eight unequal-sized spiral ribs—the posterior rib on the earlier whorls has developed into three prominent ribs, and one or more of the intermediate threads have become conspicuous, whilst the granulations of the medium rib have disappeared.

The posterior six whorls or so have occasionally all the ribs granular, thus resembling *T. Sturtii*, Tenison Woods, of the Tasmanian Miocene ; but at this early stage *T. Aldingæ* does not possess intermediate ribs as described for that shell. I am afraid that *T. Sturtii* has been established on too immature specimens ever to allow of satisfactory identification.

Dimensions.—Length, 36 ; breadth, 10·5 millemetres.

Locality and Horizon.—Argillaceous limestone and associated clays at Blanche Point, Aldinga, and Kent Town bore ; also in the "Turritella limestone" about Ardrossan.

Fissurellidæa malleata, *spec. nov.*

The Rev. Tenison Woods referred a Table Cape fossil to the recent *Fissurella concatenata*, and I had given the same name to examples collected by me from the R. Murray Cliffs and at Muddy Creek ; but a more critical comparison shows that I have been in error.

The recent and fossil forms agree in shape and in the general character of the sculpture ; but in the fossil the pits are of smaller dimensions and more numerous ; moreover the foramen is relatively larger and the median contraction is either absent or only feebly shown in the larger specimens.

The fossil species is referred to *Fissurellidæa* because of its affinity with the living South Australian *Fissurella concatenata*, Crosse, Journal de Conch., 1864, which must be transferred to that genus, because the mantle envelopes the shell, as I have ascertained by repeated observation on the living animal.

Dimensions of largest specimen.—Major and minor diameters, 30·0 and 20·0 ; height, 7·5 millimetres.

Locality and Horizon.—Gastropod bed, River Murray Cliffs, near Morgan, and its equivalent at Muddy Creek in Victoria ; Kent Town bore, Adelaide ; probably also Table Cape, Tasmania.

The Land and Freshwater Molluscs of Tropical South Australia.

By Professor Ralph Tate, Assoc. Lin. Soc., F.G.S., &c.

[Read July 5, 1882.]

The land snails of Tropical South Australia are confined to the basin of the northern rivers—to that well-marked natural region which extends from the seaboard to the escarpment of the "Desert Sandstone" plateau, inasmuch as no species has up to the present time been recorded from the extensive tract of country lying north of the MacDonnell Ranges, on the verge of the tropics, to within about one hundred miles of the coast of Arnheim Land.

That the Desert Sandstone, presumably of Miocene age, extended to the seaboard will be readily conceded by those who have studied the physiographic features of the northern part of Arnheim Land; and therefore, the region of the northern rivers, occupied by metamorphic rocks, is as a land-surface of recent date. The area of the "basin of the northern rivers" is rapidly enlarging by the removal of the "desert sandstone," by issue of water at its junction with the schistose rocks, thus originating the numerous affluents of the several large rivers of this well-watered portion of North Australia.

The very large number of immigrant plant species and genera in this region points, likewise, to a more modern origin of its flora as compared with that of the plateau of the Desert Sandstone.

We need not, then, wonder at the paucity of its land snails, whose means of dispersal are so limited, or even at the absence of those genera so characteristic of Tropical Polynesia and N.E. Australia. The climatic phenomena are, moreover, unfavourable to the establishment of species requiring shade and humidity; and the absence of land snails, over the area of the "desert sandstone" and the country to the south with which it is physically and geographically connected, must be attributed to aridity of soil and want of shelter in the form of trees or rocks. Nevertheless, it is not improbable that some species will be discovered in those insular-like masses of old rocks constituting the Ashburton, Forster's, and other Ranges.

The number of species of land mollusca now known from the region of the northern rivers is eight, distributed generically as follows:—*Helix* six, *Bulimus* one, and *Stenogyra* one. Six of these are either specifically identical or closely allied to extra-limital species. The Helices are considered peculiar to the country, but with the exception of two of them no critical comparisons seem to have been instituted. *H. pomum*, the most widely diffused, is very closely related to *H. pachystyla* of N.E. Queensland; and *H. Meadei* and *H. Lyndii* are also near allies. *H. prunum* has an analogue in *H. argillacea* of Timor, but on the other hand, it is questionably distinct from *H. Coxeni* from Whitsunday Island, off Port Denison, Queensland; and *H. Bennetti* from Ipswich, Queensland, is another critical species of the same group The facts are few, but almost warrant the inference that the Northern Territory Helices are forms of Queensland species modified in the course of their migration. The other land pulmonates are *Bulimus Beddomei*, previously known from Torres Straits, and *Stenogyra Tuckeri*, of Polynesian, if not of American origin, and probably an alien.

The freshwater shells are fairly well represented specifically, and include a greater number of endemic species than might have been expected. Almost every perennial water-course or lagoon has its molluscan denizens. But just as there are two well-marked geographical regions in tropical South Australia, so do we find a corresponding difference in the freshwater shells of the two regions.

The central portion of the continent yields *Unio Stuartii*, *Paludina Waterhousei*, and *P. Kingii*.

The basin of the Roper, *Unio Angasi;* that of the Adelaide, several *Limnæa*, *Bulinus*, *Planorbis*, *Paludina*, *Unio*, *Corbicula*, and one species of each of *Physopsis*, *Ancylus*, and *Neritina*; that of the Lower Victoria River, *Melaniæ*, a *Paludina*, a *Bulinus*, a *Bithinia*, a *Corbicula*, and a *Mycetopus*, nearly all specifically peculiar.

Several of the species have a wide range throughout the eastern half of the continent, and, with two exceptions, the genera are of world-wide distribution. *Mycetopus* has its head quarters in tropical America, but a species is known from Siam. *Physopsis* includes another species belonging to South Africa. The Australian representatives of these genera are confined within narrow limits. *Mycetopus* in one species is only known from the lower Victoria River, and *Physopsis* from the basin of the Adelaide River and Coburg Peninsula.

Helix pomum, *Pfeiffer*.

Reference.—Cox, Monograph Australian Land Shells, p. 40, t. 4, f. 7, 1868.

Synonym.—H. pseudo-Meadei, *Brazier in Harcus's S. Aust. Handbook* (name only).

This species is peculiar to Arnheim Land, though closely allied to *H. pachystyla*, Pfr., which ranges along the whole of the north-east coast of Australia. It was first obtained by MacGillivray, at Port Essington, and has since been collected in the Port Darwin district. I found it widely, but sparsely distributed over the country from Palmerston southwards to Pine Creek; it was only in the jungles near the coast that it seemed to be at all plentiful.

H. pseudo-Meadei was proposed for individuals of *H. pomum*, which exhibit a stippled ornament on the columella and callus development overspreading the body-wall of the aperture of the shell. As this character belongs to adult shells and there are no co-ordinate peculiarities, the specific name should be suppressed; it is, moreover, inaptly chosen.

Helix Meadei, *Brazier*.

Ref.—Proc. Zool. Soc., p. 662, 1870.

Syn.—H. Edwardsi, *Cox, Mon.*, p. 109, t. 19, f. 3 (non Bland).

Habitat.—Banks of the Liverpool River (Cadell Expedition).

Helix Lyndii, *Angas*.

Ref.—Proc. Zool. Soc., 1872, p. 610, t. 42, f. 1.

Hab.—Port Essington.

Helix prunum, *Ferussac*.

Ref.—Cox, Mon. Aust. Land Shells, p. 43, t. 4, f. 6.

Hab.—This species affects the sea coast, and has been collected at Port Essington on the bark of *Melaleuca* by MacGillivray, and at Palmerston by Bednall. I found many examples around Palmerston creeping about in the early morning after rains, but inland it occurred to me in single specimens at Rum Jungle and at the Stapleton River, 26 and 42 miles respectively from Southport.

Remarks.—The periostracum of the young shell is raised into short bristles, and traces of them may be seen in some individuals just prior to attaining their full size. Except in the larger size and deciduous bristles, I fail to note any other difference between this species and *H. Coxeni*, from Queensland.

Helix Creedii, *Cox*.

Ref.—Mon. Aust. Land Shells, p. 110, t. 19, f. 2.

Hab.—Cadell's Straits (Cadell Exped., 1867).

Helix Wesselensis, *Cox.*

Ref.—*Op. cit.*, p. 110, t. 19, f. 4.

Hab.—Wessel Islands (Cadell Exped.).

Helix Gaertneriana, Pfr., recorded in Cox's Monograph as from Port Essington, belongs to the Aru Islands, and is not Australian (*teste* Brazier).

Bulimus Beddomei, *Brazier.*

Ref.—*Proc. Linnean Soc., N.S.W.*, vol. iv., p. 395, 1880.

Hab.—On trees, under the loose bark, Fanny Bay, Port Darwin (Mr. E. Spalding). Also known from Mt. Ernest Id., Torres Straits (*Beddome*).

B. Beddomei is doubtfully distinct from *B. Macleayi* of the same author, which extends to Yule Id., New Guinea.

Stenogyra Tuckeri, *Pfr., sp.*

Ref.—Bulimus Tuckeri, *Pfr.; Cox, Mon. Aust. Land Shells*, p. 69, t. 13, fig. 9.

"Generally distributed throughout Queensland and its islands from Brisbane to Cape York. Found generally in the isles of the S.W. Pacific, and has been introduced to Sydney with plants from Aneiteum."—MacGillivray, in Cox, op. cit., p. 70.

Hab.—At the bases of papaya trees, Palmerston (Inspector Foelsche).

I refer this species to the tropical American genus *Stenogyra*, of Shuttleworth, and on comparison with specimens find it not readily separable from *S. mimosarum*, D'Orb (*Bulimus*).

Genus Limnæa.

The following species and *L. Lessoni*, Deshayes, are usually referred to the genus *Amphipeplea*, but without knowledge of the contained animals. With respect to the generic position of the last-named species, Mr. E. A. Smith, in Proc. Lin. Soc., London, 1882, p. 272, writes:—"It is very doubtful whether this species is a true *Amphipeplea*, upon which subject Martens (Ann. and Mag. Nat. Hist., 1866, vol. xvii., p. 212) offers some very interesting remarks." I am not able to consult the reference alluded to in the foregoing quotation, but having examined the animal of *Amphipeplea Melbournensis*, Pfr., now included among the synonyms of *L. Lessoni*, I can confidently assert that it is a *Limnæa*, and not an *Amphipeplea;* so also is a species inhabiting the Lower Murray River, which is with difficulty separable from the tropical *L. vinosa*. From analogy of shell-form, it may therefore be inferred that the Northern Territory species, which have a very close agreement one with

another, belong to *Limnæa* rather than to *Amphipeplea*. Personal examination of six species inhabiting the southern part of Australia has elicited the fact that one only, *A. papyracea*, mihi, has the mantle peculiarities of *Amphipeplea* (see Trans. of this Soc., vol. iv., p. 140, and Proc. Lin. Soc., N.S.W., vol. vi., p. 553).

Limnæa Phillipsi, *A. Adams* and *Angas*.

Ref.—*Proc. Zool. Soc.*, 1863, p. 416; *Reeve*, *Icon. Con.*, t. 6, f. 41, 1872.

Hab.—Arnheim Land (Stuart's Expedition).

Limnæa vinosa, *Adams* and *Angas*.

Ref.—*Proc. Zool. Soc.*, 1863, p. 415; *Reeve*, *op. cit.*, t. 6, f. 37.

Hab.—Mary River, Arnheim Land (Stuart's Exped.).

Limnæa Angasi, *Sowerby*.

Ref.—*Reeve's Icon. Conch.*, t. 2, f. 11, 1872.

Hab.—Port Darwin.

Genus Bulinus.

The sinistral spiral pond-snails of Australia have been placed (incorrectly so, I believe) in the genus *Physa*. The thick periostracum of most of them, which in many is prolonged into cilia or bristles, is incompatible with a largely-reflexed mantle. I have not examined all the Australian so-called *Physæ*, but in no instance have I found those distinctions which characterise *Physa* as separable from *Bulinus*. The mantle margin is neither expanded nor digitate; in *A. tenuistriata*, however, it has three small serratures on the columella side. Of the Northern Territory species, I have seen alive only *B. concinnus* and *B. Reevei*, which present the characters proper to *Bulinus*. According to Binney, "Fresh-water Shells of N. America, 1865," Adanson's name, *Bulinus*, has priority over *Aplexa*, Fleming, and is accompanied by a careful description and excellent figure.

Bulinus Hainesii, *Tryon*.

Ref.—*American Journ. Conch.*, vol. ii, t. 2, f. 9, p. 9, 1866 (Isidora).

Syn.—Physa latilabiata, *Sowerby*, *Reeve's Icon. Conch.*, t. 5, f. 33, 1873.

Hab.—Victoria River.

Bulinus ferrugineus, *Adams* and *Angas*.

Ref.—*Pro. Zool. Soc.*, p. 416, 1863; *Reeve*, *Icon. Conch.*, t. 4, f. 25 (Physa).

Hab.—Mary River, Arnheim Land (Stuart Exped.).

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Bulinus concinnus, *Adams* and *Angas.*

Ref.—*Pro. Zool. Soc.*, p. 417, 1863 (Physa); *Reeve*, *Icon. Conch.*, t. 5, f. 35; *Smith*, *Pro. Lin. Soc.*, vol. 16, p. 281, t. 6, f. 13-14, 1882.

Hab.—Arnheim Land (Stuart Exped.), Pond at "The Gums," twelve miles south from Bridge Creek, Arnheim Land. (R. T.)

Bulinus olivaceus, *Adams* and *Angas.*

Ref.—*Pro. Zool. Soc.*, p. 416, 1863 (Physa); *Reeve*, *Icon. Conch.*, t. 5, f. 34; *Smith*, loc. cit., p. 281, t. 6, f. 15.

Hab.—Arnheim Land (Stuart Exped.).

Bulinus exaratus, *E. A. Smith.*

Ref.—*Loc. cit.*, p. 292, t. 6, f. 28, 1882 (Physa).

Hab.—Port Essington.

Bulinus badius, *Adams* and *Angas.*

Ref.—*Pro. Zool. Soc.*, p. 416, 1863 (Physa); *Reeve*, *Icon. Conch.*, t. 7, f. 51.

Hab.—Mary River, Arnheim Land (Stuart Exped.).

Bulinus proteus, *Sowerby.*

Ref.—*Reeve's Icon. Conch.*, t. 6, fig. 43 (Physa).

Hab.—Adelaide River (Brit. Mus.).

Bulinus Bonus Henricus, *Adams* and *Angas.*

Ref.—*Proc. Zool. Soc.*, p. 417, 1863 (Physa); *Reeve*, *Icon. Conch.*, t. 5, f. 38; *E. A. Smith*, loc. cit., t. 6, f. 29, p. 293.

Hab.—Arnheim Land (Stuart Exped.).

Bulinus Cumingi, *H. Adams.*

Ref.—*Proc. Zool. Soc.*, p. 144, 1861 (Ameria); *Reeve*, *Icon. Conch.*, t. 6, f. 44 (Physa).

Hab.—Port Essington.

Bulinus Reevei, *Adams* and *Angas.*

Ref.—*Proc. Zool. Soc.*, 1863, p. 417 (Ameria); *Reeve*, *Icon. Conch.*, t. 6, f. 40 (Physa.)

Hab.—Arnheim Land (Stuart Exped.). Ponds by the River Adelaide, and between Howley and Yam Creeks (R.T.). Also in Yam Creek by Glencoe (J. B. Robinson, coll. Brazier and Bednall).

Physopsis Jukesii, *H. Adams.*

Ref.—*Proc. Zool. Soc.*, 1861, p. 144; *Reeve*, *Icon. Conch.*, t. 9, f. 71.

Hab.—Port Essington (Jukes, Fly Exped.). Yam Creek by Glencoe (J. B. Robinson, coll. Brazier and Bednall).

Planorbis Essingtonensis, *E. A. Smith.*

Ref.—*Proc. Lin. Soc.*, vol. xv., p. 294, t. 6, figs. 33-35.

Habitat.—Freshwater lagoons, Point Smith, near Port Essington (*Brit. Mus.*); on submerged plants, River Adelaide (R.T.).

Planorbis meniscoides, *spec. nov.*

Shell shining, pellucid, yellow-horn colour, with a sunken spire, and flattened base; umbilicus deep and narrow. Last whorl obliquely convex above the angulated periphery. Whorls four, convex, separated by a deep suture. Surface marked by strong sigmoidal striæ and folds of growth coincident with the outline of the margin of the aperture, which is very oblique.

This species resembles *Segmentina Victoriæ*, Smith, Proc. Lin. Soc., 1882, p. 296, pl. 7, figs. 11-13, from which it differs by its smaller umbilicus, flatter base, and less convexity of the upper surface.

Greatest diameter, 4·5 millim.; smallest diameter, 4, nearly; height, 1·5.

Hab.—Buffalo Swamp, Port Darwin (coll. Mr. Brazier).

Ancylus australicus, *Tate.*

Ref.—*Trans. Roy. Soc. S. Aust.*, vol. iii., p. 102, t. 4, f. 4, 1880; id. *Smith*, *P.L.S.*, t. 7, figs. 36-37, 1882.

Hab.—River Adelaide; a single specimen, but lost before comparison with type examples (R. T.). The two examples of an *Ancylus* in the British Museum from Comet Creek, Queensland (Leichardt Exped., 1844) seem to be correctly referred to this species.

Melania australis, *Lea.*

Ref.—*Proc. Zool. Soc.*, 1850, p. 185; *Reeve*, *Icon. Con.*, t. 12, f. 82.

Hab.—River Victoria (N. Aust. Exped., 1855); Port Essington (*Brit. Mus.*).

Melania carbonata, *Reeve.*

Ref.—*Icon. Con.*, fig. 88, 1859.

Hab.—Port Essington (Brit. Mus.).

Melania venustula, *Brot.*

Ref.—*Con. Cab.* ed. 2, p. 331, t. 34, fig. 5, 1874; *Smith*, *Proc. Lin. Soc.*, 1882, t. 5, figs. 9-10, p. 260.

Hab.—River Victoria (N. Aust. Exped.).

Melania onca, *A. Adams* and *Angas*,

Ref.—*Proc. Zool. Soc.*, 1863, p. 415; id, *Brot*, *op. cit.*, p. 330, t. 34, f. 7.

Hab.—Mary River, Arnheim Land (Stuart Exped.); River Adelaide (R. T.).

Melania Elseyi, *E. A. Smith.*

Ref.—*Proc. Linnean Soc.*, 1882, vol. xvi., p. 261, t. 5, f. 12.
Hab.—Australia, probably Victoria R. (N. Aust. Exped.).

Melania Balonnensis, *Conrad.*

Ref—*American Jour. Conch.*, vol. ii, p. 80, t. 1, f. 10; *Smith, op. cit.*, t. 5, f. 1-3, p. 257.
Hab.—Australia, probably Victoria River (J. R. Elsey).

Paludina Essingtonensis, *Shuttleworth.*

Ref.—*Frauenfeld, Zool-botan. Gess., Wien*, 1862, p. 1,169.
Syn.—Vivipara suprafasciata, *Tyron, Am. Jour. Conch.*, t. 11, f. 71, 1863.
Hab.—Port Essington (MacGillivray); Victoria R. (N. Aust. Exped.).

Paludina australis, *Reeve.*

Ref.—*Icon. Con.*, t. 11, f. 71, 1863.
Syn.—P. ampullaroides, *Hanley in Reeve, Icon. Con.*, f. 30; P. affinis, *Martens, Ann. Mag. Nat. Hist.*, 1865.
Hab.—Port Essington (Capt. Wickham); Victoria R. (N. Aust. Exped.); Depot Creek, ten miles south from R. Adelaide; and lagoons by The Gums, twelve miles south from Bridge Creek, Arnheim Land (R.T.); Yam Creek at Glencoe (Mr. J. B. Robinson, coll. Mr. Bednall).

Paludina tricincta, *E. A. Smith.*

Ref.—*Proc. Linn. Soc.*, 1882, vol. xvi., p. 265, t. 7, f. 16 (Paludina).
Hab.—North Australia [probably Victoria R.] (J. R. Elsey, N. Aust. Exped.).

Paludina dimidiata, *E. A. Smith.*

Ref.—*Loc. cit.*, t. 7, f. 17 (Vivipara).
Hab.—Victoria River (N. Aust. Exped.).

Paludina Waterhousei, *A. Adams* and *Angas.*

Ref.—*Proc. Zool. Soc.*, 1863, p. 414; *Smith, Proc. Lin. Soc.*, 1882, t. 7. f. 14 (Vivipara).
Hab.—Newcastle Waters (Stuart Exped.).

Paludina Kingii, *Adams* and *Angas.*

Ref.—*Proc. Zool. Soc.*, 1863, p. 415; *Smith, P.L.S.*, 1882, t. 7, f. 15 (Vivipara).
Hab.—King's Ponds (Stuart Exped.).

Bithinia Smithii, *Tate.*

Syn.—B. australis, *Smith, Proc. Lin. Soc.*, 1882, p. 267, t. 7, f. 18; non, *Tate* and *Brazier, Proc. Lin. Soc.*, N.S.W., 1881, p. 562.
Hab.—Victoria River (N. Aust. Exped.).

The genus *Gabbia* was founded on an erroneous interpretation of the characters of a freshwater shell from New South Wales. "Shell like *Amnicola*; operculum, *paucispiral* and calcareous." "The figure of the unique species *G. australis*, Tryon, Am. Journ. Conch., 1865, p. 220, t. 22, f. 7, reminds us of *Bithinia* rather than any other genus, for in it the operculum is represented as decidedly concentric, although said to be paucispiral in the description" (Stimpson, on the Hydrobiinæ, p. 56).

Later, Mr. Brazier described a shell from New South Wales as *Bithinia hyalina*. An examination of typical specimens proves the correctness of the generic position assigned, but a comparison with the figure of *Gabbia australis* leaves no doubt as to the specific identity of the two. The shell has, therefore, been catalogued by Messrs. Tate and Brazier as *Bithinia australis*, Tryon, sp.; consequently a new name must be given to the *B. australis* of Mr. Smith, and I have much pleasure in proposing that of *Smithii*, after its original describer.

Neritina crepidularia, *Lamarck*.

Ref.—*Reeve*, *Icon. Con.*, t. 8, f. 38.

Hab.—Port Essington (Capt. Wickham and J. B. Jukes).

Corbicula ovalina, *Deshayes*.

Ref.—*Proc. Zool. Soc.*, 1854, p. 343; *Smith*, *Proc. Lin. Soc.*, 1882, p. 299, t. 7, figs. 24-25.

Hab.—Port Essington. Adelaide River (R.T.), a doubtful identification.

Corbicula Deshayesii, *E. B. Smith*.

Ref.—*Op. cit.*, p. 303, t. 7, figs. 28-29.

Hab.—Victoria River and Port Essington.

Unia Stuartii, *Adams* and *Angas*.

Ref—*Proc. Zool. Soc.*, 1863, p. 417 (Alasmodon); *Reeve*, *Icon. Con.*, t. 54, f. 279 (Anodon).

Hab.—Newcastle Waters (Stuart Exped.); also in extra-tropical Central Australia.

Remarks.—I do not know why this shell was placed under *Alasmodon*. In all stages of growth all the teeth are developed, all are laminar, elongated, and slightly crenulated on the margin; anterior 2.1, posterior 1.2. A large example from Newcastle Waters has the following dimensions:—Length, 107; breadth, 52; thickness, 30; anterior side, 28; posterior side, 79 millimetres.

Unio Bednalli, *spec. nov.*

Transversely elongate-oblong, about twice as long as broad; thin, sub-compressed. Epidermis thick, dark brown, radially striated, and concentrically striated between the folds of growth, wrinkled in the flattish postero-dorsal region. Umbones, at about the anterior third, moderately inflated; anterior margin rounded, ventral nearly straight, posterior obliquely truncate. Teeth as in *U. Stuartii.* Interior of valves iridescent bluish, radiately striated. Length, 79; breadth, 40; thickness, 30; anterior side, 23; posterior, 56 millimetres.

Hab.—River Adelaide, at the ford (R.T.); Yam Creek, at Glencoe (Mr. J. B. Robinson, coll. Mr. Bednall).

Remarks.—U. Bednalli is related to *U. Stuartii,* from which it differs in being more tumid, less inequilateral, and in its truncated, not acuminate, posterior margin. The epidermis of young shells of *U. Stuartii* is of a pale brown colour, whilst that of *U. Bednalli* is always blackish-brown.

I have much pleasure in naming this form after Mr. W. T. Bednall, to whom science is indebted for bringing to notice many interesting marine species from the Northern Territory and other parts of Australia.

Unio Angasi, *Reeve.*

Ref.—Icon. Conch., t. 55, f. 282, 1867.

Hab.—Strangway's River, tributary of the Roper (Stuart Exped.).

Unio (aff.) Angasi.

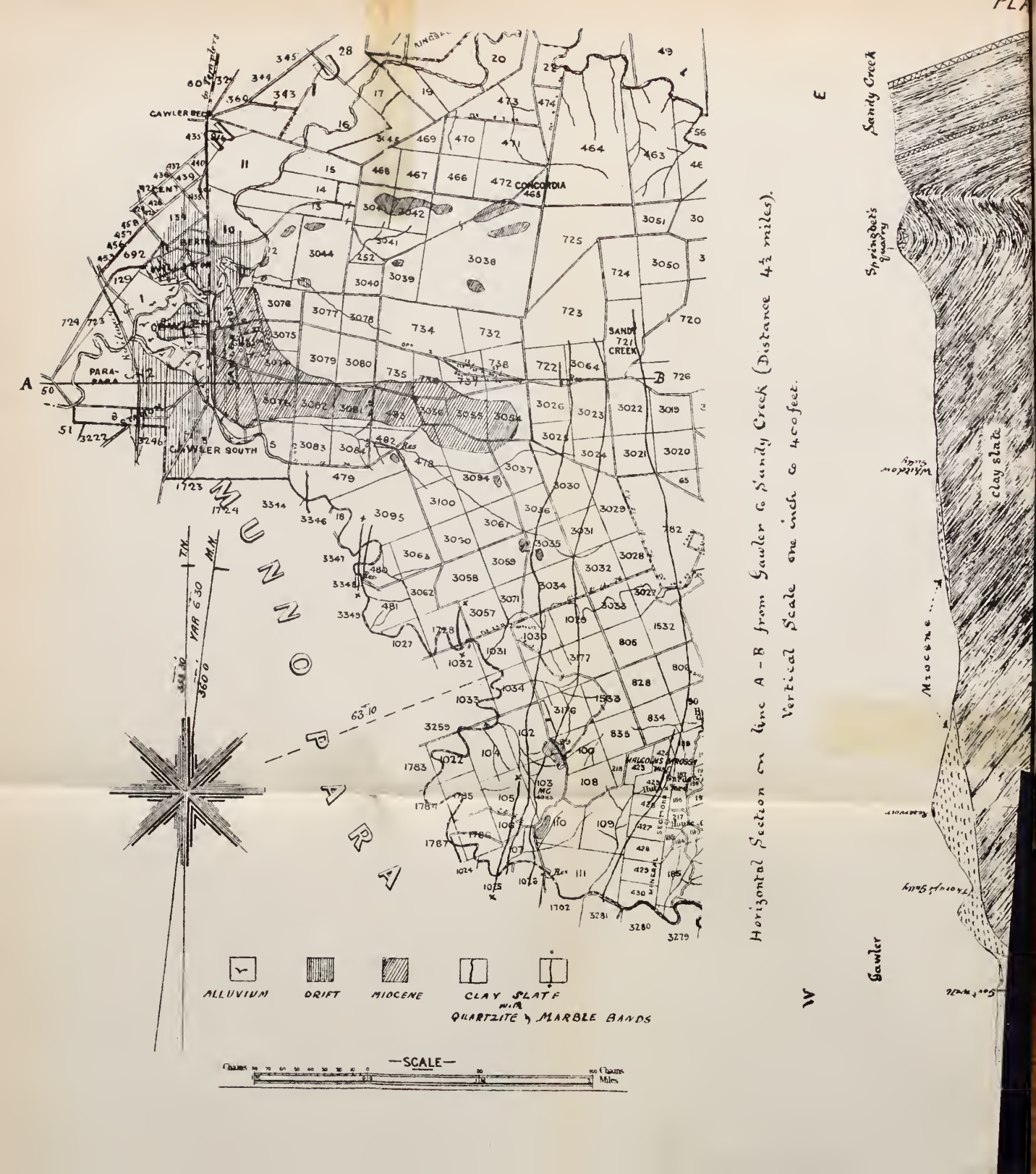
Hab.—Ponds by the River Adelaide at the ford and tributaries of the River McKinlay (R.T.).

This form differs from *Angasi* in being more depressed and more arched behind the umbones; the interior is bluish iridescent. Leichardt recorded Unios from the South Alligator River, "smaller than those in the Roper;" these may belong to the same species inhabiting the McKinlay River.

Mycetopus rugatus, *Sowerby.*

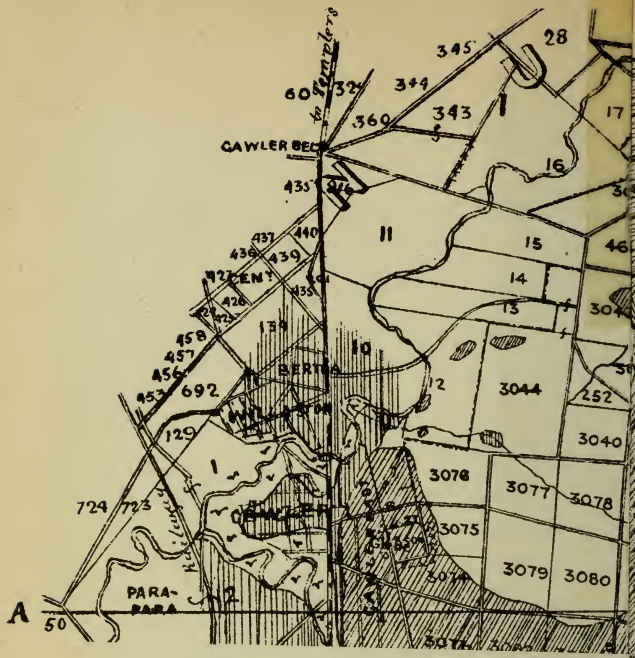
Ref.—Reeve's Icon. Conch., t. 17, f. 7; *E. A. Smith* in "Voyage Erebus," t. 4, f. 1.

Hab.—Victoria River (Capt. Wickham).



Horizontal Section on line A-B from Gawler to Sandy Creek (Distance 4½ miles).
Vertical Scale one inch to 400 feet.

PL



to Templers
GAWLER BELT
CENT
BERTHA
PARA-PARA
A
50
60
345
344
343
360
28
17
16
11
15
14
13
10
12
3044
252
3040
3076
3077
3078
3075
3079
3080
692
129
724
723

The Geology of the Neighbourhood of Gawler.

By Gavin Scoular, Corr. Memb.

[Read August 1, 1882.]

[Plates II.]

The geological features of the site of the town of Gawler are somewhat diversified and interesting, for no less than four different formations are represented, viz., the fundamental, or "Pre-Silurian Rocks," as displayed on the north bank of the South Para and south bank of the North Para Rivers respectively; Marine Miocenes well exposed in Thorup's Ravine to the east of High-street; Drift, or Pliocene deposits, throughout the Church Hill and old Cemetery area, extending east as far as Blanche-street; Quaternary, in the channels and adjacent to the Para Rivers.

Pre-Silurian Rocks.

The surface configuration of the Pre-Silurian country, which is situated to the east of Gawler Town, is undulating and ridgy on the south-eastern section, whilst on the north-eastern section it is that of isolated conical hills, which for the most part are crowned with reconstructed Miocene detritus, but in a few instances the capping is composed of the original deposit.

Clay Slate.—This rock comprises quite 98 per cent. of the area occupied by the fundamental rocks, and may be studied where outcropping from beneath the Miocenes on the north bank of the South Para (Allotment 327, Hundred Nuriootpa), and on the north side of the town, on the south-east bank of the North Para and bed of Whitlaw Gully, leading through Section 7 of the same hundred. From these points the beds can be traced in ascending order on either side of the Gawler Marine Miocene escarpment, especially on the north bank of the South Para may the various intercalations of the beds be studied with advantage; and in Section 3034, Hundred of Barossa (Cockatoo Creek) a fine section of the slate is exposed in a vertical position. There can be no doubt that in this place we have revealed to us a synclinal axis, which is traceable in a northly direction from the south bank of the South

Para—Section 1026, Hundred of Para Wirra, to Section 3064, Hundred of Barossa, a distance of four and a half miles.

Though clay-slate is frequently seen at the surface over the south-western portion of Barossa, yet it is only from a few of the outcrops that accurate bearings are obtainable. In Allotment 330, dip 40°, and easterly strike 15° to west of mag. north. The clay-slate here has been used for building purposes, is of the usual argillaceous character, and of medium hardness. In the bed of Spring Gully—Section 5, Hundred of Barossa—a fairly-readable section of the beds is exposed. The dip is 35°, and easterly strike 10° east of north. In Section 3034 the clay-slate is exposed in a vertical position. On the north-western side, in Section 7, Hundred of Nuriootpa, dip 45° easterly, strata somewhat talcose, and much crumpled transversely to the line of strike; also associated with siliceous infiltrations. Section 3044 (Whitlaw Gully), dip 30° easterly, beds presenting the ordinary appearance.

Quartzites.—In Barossa, as well as in Munno Para, as shown in my geological sketch of that Hundred (Transactions of the Royal Society of South Australia, vol. iii., page 106), do the more massive intercalations of quartzite determine to a large extent the surface configuration of the area in which they occur.

The gentle and undulating surface of Western Barossa contrasts with the rugged grandeur constituting the almost inaccessible slopes and peaks of north-western Munno Para. Of the many quartzite bands so extensively developed in the latter area only one or two at the most extend into Western Barossa, and that only for a distance of three-quarters of a mile. But the quartzite bands that do occur in Western Barossa are the northern extension of the quartzites of Western Para Wirra that are shown in the horizontal section accompanying the "Geology of Munno Para" (Transactions Royal Society of South Australia, vol. iii., plate 6, figure 2.)

Though probably diminishing slightly in thickness as they extend through Barossa, yet their stratigraphical characteristics, especially those of the lower or western band, become very interesting.

On the south bank of the South Para River, in Section 1702, Hundred of Para Wirra, the first tangible sign of disturbance or folding of the strata is displayed; and on the northern side of the gorge, about 200 feet above the bed of the stream, on the western boundary of Section 110, Hundred of Barossa, the practised eye can discover that the strata have been subjected to a powerful pressure acting transversely to the strike. In Section 1702, Hundred of Para Wirra, the synclinal and anticlinal folding of the strata, as shown in the cross section

accompanying this paper, becomes first observable, and it is only at intervening places going north to this point that the axis of the syncline is preserved—as only the most depressed parts along the axis of the syncline have escaped denudation. The localities where these phenomena are shown most visibly are laid down on the map.

On the south side, but especially on the northern side of Cockatoo Creek, in Sections 1030 and 3034, a conspicuous section of the synclinal folding is displayed. From the somewhat indistinct manner the quartzites are exposed on the south side of the creek, it is difficult to describe their exact relative position. Here the synclinal axis seems to be confined within the quartzites, and so severely have the upper beds of the band been acted upon by pressure whilst undergoing the process of folding that a casual observance of the beds in that particular place might readily be set down as a re-deposition of the original material. On the northern side of the creek the section is less obscure, and a pretty correct analysis of the position of the beds has been ascertained. Whilst in company with Professor Tate, on the eastern side of the band, in Section 1030, we found the beds well defined, and dipping 80° westerly. Very nearly on the same line of strike, and about five chains north from this point, in Section 3034, we found the dip to be 70° westerly. The strike at both places is 10° west of mag. north. Though no exposure of the quartzites on the western side of the band is here displayed, it is evident from the position the clay-slate assumes a few chains to the west, viz., dipping easterly, that the axis of the syncline, if not actually occurring within the quartzites, must be in close proximity on the western side of the band.

As further proof of the uninterrupted occurrence of this synclinal fold extending for miles along the strike of the beds, the high westerly inclination of the quartzites is well exhibited in two separate quarries in Sections 3035 and 3036. In the southern quarry, in Section 3035, dip 80° west, strike mag. north, and the northern quarry, situated on the southern side of Section 3036, dip 75° west, and the strike also mag. north. Here it is also evident the synclinal axis must either be within the quartzite beds or in very close proximity west of them, for, as at Cockatoo Creek, the westerly dipping side of the fold, by artificial means, is also well exposed. The easterly dipping section, though it cannot be far distant, is obscured by the overlaying detritus.

From this point quartzite is but faintly seen on the higher ground, and it is not until reaching Section 3064 that it again boldly comes to view. Here a quarry (Springbett's) has been opened on it on the southern slope of the east and west

ridge. The stratigraphical relation of the beds are much easier determined here than in Sections 3034, 3035, or in 3036, and, as shown in my horizontal section, the eastern limb of the syncline of the quartzite band dips 35° westerly, and the strike is 10° west of mag. north. The quartzite folding round the superimposed clay-slate appears on the western side of the reserve, in Section 722. As represented by horizontal section, it will be seen that the anticlinal axis of the band and a considerable portion of the subterimposed clay-slate have been carried away by subsequent denudation, and that the actual dip side of the quartzite band constitutes an integral part of the formation about 20 chains to the east. The stone in this quarry, and also in those situated in Sections 3036, 3035, and 3034, is better adapted for road than architectural purposes.

It is noteworthy that for a distance of over four miles we have indubitable evidence of the occurrence of foldings nearly parallel with the strike of the beds; this by some might be regarded as being only on a small scale, but its presence suggests the probable existence of others of greater magnitude hidden from our observation; therefore a difficulty arises in correctly estimating the actual thickness of partially-concealed strata.

Eastern Quartzite Band.—The eastern quartzite band, as it appears on the south bank of the South Para River, in Section 3281, north-western Para Wirra, makes the prominent landmark locally known as the Boar's Snout. This band, which is here of vast thickness, constitutes the high ground to the west of the deserted auriferous Miocene cement workings of Victoria Hill, passes through mineral Section 426, where it has been invaded transversely by denusive agency to such an extent as to admit of the detritus of the auriferous cements on the eastern side being carried some considerable distance to the west. Passing immediately to the east of "Malcolm's Barossa" Mine, it constitutes the high ground between that mine and the alluvial diggings of Spike Gully; it intersects Cockatoo Creek in Section 782, from thence through Sections 3021, 3022, and 721. In Section 726, where also a quarry of road metal is situated, the dip of the band is 68° easterly, strike 5° west of mag. north, thickness estimated from 60 to 80 feet. It is here of medium hardness, and is composed of fine grains of quartz held together by felspathic paste, which being subject to decay renders the stone somewhat too friable for road purposes.

Fundamental Limestone, or Marble.

The susceptibility of this stone to uniformity of decay and the frequent occurrence of Miocene *debris* spread over its surface throughout the area of Western Barossa make it difficult

to trace its outcrops for any appreciable distance. There is no doubt, however, that the bands occurring in Sections 3347 and 1032, Hundred of Munno Para, extend north into Sections 1728 and 3095, Hundred of Barossa, while the line of outcrop of the western Para Wirra band can be easily followed in Para Wirra for a distance of nearly three miles, is on entering Barossa only well exposed on the road leading between Sections 107 and 106, becoming entirely obscure in Section 105.

Quartz Veins.

The primary object of the geologist is simply to characterise the stratigraphical relation of the beds upon which he essays to treat. But the district of Barossa being one, in some measure at least, associated with mining enterprise, and the subject of discussion, viz., "quartz veins," being fraught with much interest to the public—especially to those engaged in a mining venture—as to the percentage of their metalliferous contents, for this reason it is with considerable diffidence to suit the various feelings I approach this part of my subject. Also, I trust, the scientist in this particular walk will kindly correct any inadvertency into which the following remarks may tend to lead.

On the north bank of the South Para River, in allotment 337, there occurs a quartz vein of considerable thickness in connection with numerous leaders, or rather subsequent infiltrations, of quartz throughout the adjoining clay-slate; the dip and strike of the vein itself is apparently in conformity with the lay of the surrounding beds. A vein of quartz in Section 479, Hundred of Barossa, is of considerable thickness, but is barren of metalliferous properties. Another which extends south into Munno Para is exposed in uniformity with the dip and strike of the slate rocks in the precipitous bank of the river in Section 3095. The apparent strike of this vein leads me to conclude it to be the southern continuation of the vein exposed on the southern side of Spring Gully in Section 482. Here the vein-stuff is composed of barren massive white quartz, and over twenty feet in thickness, which on the northern side of the ravine is entirely hid from view by the overlying Miocene beds. On the south side of the gully, in the same section, to the west of this reef a heterogenous interlamination of slate and quartz peeps out, and is traceable for a considerable distance conformable with the general strike of the beds. This phenomenon, has, however, evidently no direct connection with any well-defined system of quartz veins, but is merely one of those nest-and-string-like occurrences so frequently found displayed throughout the slate rocks of the neighbourhood.

North-east of Gawler, in the bed and south bank of

Whitlaw Gully, Section 7, Hundred of Nuriootpa, a deserted drive, situated on the southern side of the gully, has been extended into a similar heterogenous mass, a distance of from 20 to 30 feet. This adit penetrates the strata at an angle of about 45° south-east to the line of strike. Though of little or no mineralogic value, it is, nevertheless, interesting to the geologist in so far as it exposes a rock section which otherwise would have been concealed.

On the western side of the eastern quartzite band laid down on the map, and embraced in the sketch, a quartz vein, which has several quartz leaders, intersects Sections 424, 425, and 426, and is well known to extend into Section 834. Here the leaders, or quartz interlaminations, have been proved in the Malcolm's Barossa Mine to contain copper and gold; but up to date neither of the metals has been found in payable quantities.

I may here remark that none of the Barossa quartz veins has proved metalliferous in a high degree, and it is a noteworthy fact that the quartzite band passing immediately to the east of this mine and extending north and south many miles throughout northern Para Wirra and southern Barossa at least is the line of demarcation between the more highly metamorphosed rocks on the eastern side and the less altered rocks on the western side of the band. If accessive metamorphism be at all conducive to the concentration of metallic deposits, then, as metallic deposits are only sparingly distributed in the reefs on the eastern side of the band where metamorphic agency has been most potent, they will be still more sparingly distributed on the western side where metamorphism has evidently been much less active.

Miocene.

Superficial Area.—The *debris* derived from this formation constitutes most of the soils and subsoils immediately to the east of Gawler and throughout the higher tracts in Concordia District, and in the same detached condition it stretches south-easterly into upper Cockatoo Creek. Also the gravelly gold-bearing cements of Yatta Creek, Victoria Hill, and neighbourhood, and on towards Williamstown belong to the same geological epoch. Indubitable evidence still exists to show that this formation, in a fragmentary state, extends to a height of at least 1,000 feet above sea level, and that that portion of Barossa Hundred, comprising the Barossa goldfields, Cockatoo Creek, Lyndoch Valley, Concordia, and immediately to the east of Gawler, was at one time uninterruptedly overlain with Miocene strata. In the immediate neighbourhood of Gawler its vertical thickness must have been something very consider-

able, for the portion still remaining east of Murray-street—Thorup's Ravine—still represents a thickness which cannot be far short of 80 feet. A section of the beds in this gully, and adjoining slope south of the horizontal sectional line, is as follows :—

Strata unseen, occupying the southern slope between actual summit of the quarry, and where the cross sectional line traverses the strata. Additional depth	16	feet
Gravels	4	"
Gravels, sometimes conglomerates	8	"
Micaceous sandstone	12	"
Sandstone, fossiliferous	18	"
Unseen immediately opposite the quarry, but lower portion shown elsewhere in bed of the ravine, much thinner bedded sandstone	12	"
Total from top of quarry to bed of ravine ...	54	"

From the escarpment at Gawler these Miocene beds extend uninterruptedly inland to the east for a distance of about three and three-quarter miles, and they are also exposed in many isolated patches throughout western Barossa, but do not, however, afford any good sections. As a rule, the beds are composed of fine sand and a gravel chiefly of quartz pebbles. The pebbles, though generally small, are present in various forms—from the rhomb, as if newly torn from the parent rock, to that of the highly waterworn and globular. The ferro-arenaceous and pebbly character of the beds, and the high slope of the surface of the old rocks on which they rest, indicate that the portion now remaining is merely the littoral deposit of the formation. Under such circumstances it is not to be wondered that the organic forms are few and ill preserved. Sir Charles Lyell, in his "Elements of Geology," sixth edition, page 445, where he treats of the "Origin of New Red Sandstone and Rock-salt," says :—"It is a general fact, and one not yet accounted for, that scarcely any fossil remains are preserved in stratified rocks in which this oxide of iron abounds ; and where we find fossils in the New or Old Red Sandstone in England, it is in the grey and usually calcareous beds that they occur."

This oxide of iron is the constituent the Gawler and Barossa beds abound in ; but whether its presence has any bearing upon the non-fossiliferous condition of the Gawler and Upland Miocenes is a subject well worth further consideration. The sparsely fossiliferous beds at Gawler extend without a break to the east, and attain an elevation of about 420 feet above sea

level, and outliers of this formation are distributed at much higher altitudes over the adjoining country. These outliers differ very much in stratigraphical character; some are highly ferruginous, whilst others are chiefly composed of small quartz pebbles cemented together by a ferruginous paste; others again consist of fine sand particles impregnated with ferruginous matter. The best section of one of these outliers is that exposed in a cutting on the road leading between Sections 3035 and 3059. The excavation is from 4 to 5 feet, comprising bedded sand rock 3 feet 6 inches under a cover of earthy sand and surface deposits 1 foot 6 inches. The plane of bedding, as nearly as could be ascertained, is horizontal.

The following is a vertical section of the Gawler Reservoir, which has recently been excavated to a depth of 12 feet in the Miocene beds, situated in Section 3073, Hundred of Barossa, and at an elevation of 389 feet above sea level :—

	FT.	IN.
Dark-coloured soil	0	6
Subsoil, marly clay	1	6
Stiff chocolate coloured clay, supposed to be Miocene ...	6	0
Soft unfossiliferous sand rock, ferruginous	4	0
Total	12	0

Fossil Remains collected from the Gawler beds at Thorup's Ravine, and determined by Professor Tate, are as follows :— Clathurella, sp. ; Teredo, sp. ; Cardium, sp., aff. acuticostatum ; Trigonia semiundulata, McCoy ; Leda Marthæ (?), McCoy.

In Thorup's Ravine, and throughout the area of Gawler East, especially at Mars Hill, many fine specimens of silicified wood have been discovered, both *in situ* and in the *debris*. Though chiefly found in a fragmentary state, yet the freshly woody-fractured appearance many of the specimens present leads to the conclusion that the site of their growth was not far distant. Also on the south-south-east side of Cockatoo Valley the leaves of a tree evidently belonging to some of the existing Australian species have lately been discovered in a highly ferruginised sandstone of Miocene age. This interesting specimen is exhibited in the Gawler Museum. In treating of the silicified wood of Gawler, Professor Tate, in his annual address to the Philosophical Society of South Australia for 1878-9, page 59, says :—"Again, the scarped ridge east of the main street of Gawler is made up of coarse sand, crowned by rounded gravel. The sands contain blocks of stone, resulting from consolidation of the sands by carbonate of lime, which yield a few marine fossils, and also silicified stems, having a structure resembling that of *Casuarina* and *Eucalyptus*." The Professor adds :—"The process of silicification took place sub-

sequent to entombment in the marine or estuarine beds, because the stems are not infrequently found to be drilled by Teredos." Such a commingling, as witnessed at Gawler, of portions of comparatively stately land plants with marine forms undoubtedly reminds us that a much greater annual rainfall took place in Australia during probably the close of the Miocene period than what we at present witness.

In concluding this sketch of the Miocene, I might instance three notable sites where highly waterworn conglomerates of Miocene age are found resting immediately upon the upturned edges of the old rocks, viz., in a small gully leading into Whitlaw Gully on the south side, and south bank of the North Para River, both of which are situated in Section 12, Hundred of Nuriootpa. Also on the eastern side of Section 479, at an elevation of not less than 400 feet, a ferruginous conglomerate of the same age and kind occurs. All these sections are well exposed, and exhibit strong proof that they at some distant period constituted portions of a Miocene shore-line.

Drift, or Pliocene.

Area.—On account of the bold character of the pre-existing surface immediately to the east of Murray-street, very little of the formation has been preserved *in situ* east of the Miocene escarpment. So far as the lower or western part of the town is concerned, the deposits embracing the site of that part have in a marked degree been laid down against a Miocene cliff, which prior to the period of the Drift must have presented a high and bold outline to the eastward, where Murray-street is now situated. In defining the boundary of the main sheet of this formation as developed at Gawler, I might here say a small patch of it occurs on the north bank of the South Para River, in allotments 327 and 328, and continues to extend north along High-street, embracing the site of the Old Cemetery, Church Hill area, &c., Gawler North, and several other small detached areas throughout the tract embraced in the sketch.

Thickness.—The vertical depth of this formation about Gawler must vary with the increasing distance as we recede from its outcrop. Tracing it from east to west, the thickness of the formation at Gawler cannot be compared with what it attains in parts of the eastern seaboard of St. Vincent's Gulf; as, for an instance, the bore-hole at Port Wakefield shows the depth of the Drift to be there 292 feet below present sea level, and the main mass of the formation on Gawler plains attain an altitude of 450 feet above the present sea-line; therefore we have pretty conclusive evidence that a continuous depression or sinking of Gulf St. Vincent and neighbourhood

took place during the deposition of the Drift to the extent of something closely approaching 800 feet. By directing attention to this fact, I do not mean to infer that the formation ever attained a thickness of 800 feet in any part of the neighbourhood referred to, but that a steady oscillation of land and water to that extent over the area has taken place so recently, geologically speaking. This view harmonises in a marked degree with Dr. Croll's cosmical theory of the glacial epoch of the northern hemisphere, and was applied by me as originative of the Australian Drift period (see Transactions of the Adelaide Philosophical Society, 1878-9, pages 65 and 66).

Quaternary.

This formation embraces a considerable portion of Murray-street, the lower portion of the site of the town, the greater portion of the Park Lands, and also detached areas, as exhibited in Spring Gully, Cockatoo Creek, Whitlaw Gully, and North and South Para River.

Soils and Subsoils.

Alluvial.—The site of the greatest part of this description of soil about Gawler precludes its fullest utilization for garden or other productive purposes.

Drift.—Soils derived direct from this formation are chiefly confined within the limit of the site of the town, therefore they are also of little or no agricultural or horticultural value.

Miocene.—The soils of Gawler, which have been chiefly derived from the waste of the underlying Miocene rocks, present a kindly character and greater adaptability to the growth of the native pine and kindred species, shrubs, &c., than either the soils of the Drift proper, or those immediately derived from the fundamental rocks. To the north-east of this tract, throughout the sub-division of Western Barossa, known as the Concordia District, the surface outlines of the country are undulating, and the soils and subsoils of a mixed character; the hill-tops being covered with soils—including many quartz pebbles—which have evidently been derived from the waste of pre-existing Miocene beds, whilst the adjoining flats—the beds of which, since Miocene times, have been denuded below the horizon of the fundamental rocks—are now covered with soils and subsoils derived from both formations. On my examination of this part of the district I was impressed with the idea that the soils and subsoils of the flats were outliers of the true Drift; but on further consideration, after having revisited the locality, I have satisfied myself that they are chiefly of a sub-aerial wash from the adjoining slopes.

Fundamental Rocks.—On the south of the Gawler Miocenes,

and extending to the quartzite band passing between Sections 111 and 726, on the east, the soils and subsoils—with a few exceptions, where outliers of the Miocene beds occur—have been derived from the decay of the underlying fundamental rocks. Where the substratum is clay-slate, and the soil and subsoil of moderate depth to the bed rock, these, though at first less fertile than those derived from the Miocenes, are much more enduring.

Water, Surface and Subterranean.

Surface.—Surface water at Gawler during the summer months is obtained chiefly from the North Para. Though a plentiful supply pours down the channel of the South Para in winter, the stream, on reaching the drift formation, ceases to flow during the months of summer. In Cockatoo Creek a moderate supply is sustained at all seasons of the year; and Mr. John Martin informs me that Spring Gully, though at no season of the year a large stream, continues to trickle through the pebbles in its bed during the dry months of summer. In connection with these creeks, I might here remark that the drainage area of both is, in a great measure, overlain with Miocene beds. As to the hydrological properties of the Upland Miocene, I refer to Transactions of the Royal Society of South Australia, vol. iii., page 110. None of the minor gullies throughout the tract embraced in sketch sustains surface water all the year round.

Water-bearing Properties of the Drift at Gawler compared with those of Munno Para, East of Smithfield.—The Government well at Gawler, is undoubtedly situated in the drift area, and according to Parliamentary paper, 5th July, 1881, a section of the strata penetrated is as follows:—

Surface portion of the shaft, chiefly gravel and sand, with some bands of clay intervening. Water struck

Thirty-five feet from the surface, sand and boulders	35 feet.
Shaft sunk a further depth of 17 feet	17 "
Tubes were driven down a further depth of 40 feet into sand and gravel	40 "
Total depth of perforation	92 "

The base of these interbedded clays, sands, and gravels which I refer to the Drift, is only 75 feet above the present sea level. That they are water-bearing here, and not elsewhere in Munno Para (see Transactions of the Philosophical Society of South Australia for 1878-9, page 63), can only be attributed to the excess of inflow over the outflow. That this excessive inflow is not due to subterranean permeation direct from the older rocks is pretty evident, because no

water is found in the Miocene of the immediate neighbourhood, and in Section 3076, Hundred of Barossa, where water is found in the fundamental rocks, the waterline is considerably higher than that in the Gawler drift sands. Taking into consideration the limited depth of clayey deposits overlying the drift sands in the beds of the North and South Para Rivers, it is therefore evident that the water supply obtained in the Government and private wells throughout Gawler is chiefly derived from infiltration of river waters as they pass over the thin superficial stratum of pervious deposit at or near the junction of the Drift with the old rocks. In support of this opinion I have to state that the South Para ceases to flow for five months in twelve over the Drift within a few yards of the Government well, which is only 35 feet in depth from the surface to the water-line; and as the bed of the river is 15 feet below the level of the mouth of the well, consequently the river bed is but 20 feet above the water-line in the well. The stream, thus situated, and flowing—especially during high flood—a distance of not less than 15 chains over so pervious a material, as shown by the strata exposed in the well, must penetrate and surcharge the underlying sands and gravels to the fullest extent. Whilst considering this seemingly unlimited water supply, we must not overlook the fact that the beds in which it is stored, at an elevation of 132 feet above sea level, constitute an integral part of a formation extending far below the present shore line; it is, therefore, perfectly evident that a barrier of impervious material, sufficient to oppose the further downflow of the water absorbed by the Gawler sandbeds, exists at no great distance to the west, otherwise these beds would, like their prototypes east of Smithfield and in Section 3205, Munno Para, be non-productive of water, showing also that the well from which the Gawler Waterworks is supplied merely taps this subterranean lake, and derives its supply chiefly from the flood-waters of the South Para. It, therefore, becomes a critical point to consider whether its contents during the dry season—especially a prolonged one—will be sufficient to meet the requirements for which the works were originally executed.

Previous to the Government undertaking, the Drift yielded, for all purposes, a moderate supply of subterranean water from wells throughout the town and suburbs. The supply of these being derived from the same source, it is highly probable that the Government well will partially drain those during summer droughts, and the inhabitants and factories, especially the latter, will become dependent upon the waterworks for a supply during those periods.

Miocene.—About Gawler and Western Barossa, as in Munno Para, the Miocene beds, though good rain collectors and of

highly absorbent properties, constitute no actual subterranean lodgment within the area named. Nevertheless, the beds still remaining to the east and north-east of the town aid in an indirect way most powerfully the production of the water supply found in the subaerial Drifts of the low-lying tracts throughout the Concordia district, as also the water supply to wells in the fundamental rocks. And, as already noticed, the surface drainage of Spring Gully and Cockatoo Creek is traceable to the same indirect source.

Fundamental Rocks.—On the southern side of Section 3076 passable fair water was struck in the clay slate at a depth of 95 feet from the surface. A section of the strata penetrated is as follows :—

Surface and subsoil	12	feet
Limestone rubble (?)	45	"
(From a description given of the nature of this rubble by Mr. T. Barrett, digger, and owner of the well, I am inclined to set this 45 feet of so-called limestone rubble down as being Miocene.)		
Clay slate	50	"
Total	107	"

Also in Section 3077 a good supply of very passable water was found in the slate rock in Whitlaw Gully at a depth of not more than 15 feet below the bed of the ravine.

Economics.

Gold.—Though the precious metal was known to be sparingly distributed throughout the sands and gravels in the bed of the South Para River as early as 1851, it was not until its discovery in the Pliocene alluvial deposits of Spike Gully in 1868 that much attention was directed to its presence in these regions. Soon after this the auriferous Miocene cements of Victoria Hill attracted special notice, and though they could be considered neither highly productive nor of great superficial area, yet ardent hopes were entertained that better results would be obtained at greater depths in the neighbouring quartz reefs ; hence a desire arose to test the auriferous properties of the quartz veins.

The most probably auriferous quartz veins of Barossa are chiefly confined to the eastern, or Spike Gully side of the quartzite series laid down in the map accompanying this geological sketch. As to the probability of gold or other metals being diffused throughout the quartz veins situated on the western side of that quartzite band, I will offer a few remarks. About eight years ago a mine was started—since known as " Malcolm's Barossa"—on the reef or reefs situated in Mineral

Section 424. Subsequently a shaft was sunk on the property to a depth of 200 feet, a steam engine and other necessary appliances were erected, five trial or test drives in that depth were made in various directions to ascertain the metalliferous character of the quartz veins intersecting the property—as officially reported—in which both gold and copper were obtained, and yet the mine, for the time being, was abandoned because it did not pay working expenses. At date, working operations are again in full activity, and with what result at greater depths time will reveal. But my opinion as to the gold-bearing character of the property is adverse to its becoming more auriferous at greater depths than it has proven to be nearer the surface—(1) Because the partially-auriferous quartz veins of Barossa are associated with rocks which belong to an age anterior to that in which highly and regularly auriferised veins are known to exist in any part of the world; (2) Apart from the age of the rocks, no similarity exist between the condition of the Barossa beds and those of the neighbouring colonies with which auriferous veins are associated. The Silurian rocks of the neighbouring colonies have been subjected to plutonic outbursts of granites and felstones, unknown among the fundamental rocks of Barossa; and in more recent times, especially in Victoria, where the quartz veins traversing the Silurian rocks have been found to be most highly impregnated with gold, it is near to where volcanic agency has been most potent during middle and more recent Tertiary times (see Anniversary Address by Professor Tate to the Royal Society of South Australia, for 1880-81, page 119). Therefore I conclude that, although some of the Barossa quartz reefs are found sparingly auriferous in patches at or near the surface, according to the foregoing argument, it is no warrant of the precious metal becoming more generally and exuberantly diffused throughout the veins at greater depth.

Copper.—Ores of this metal have been found sparingly diffused in various parts throughout the district. It is at "Malcolm's Barossa" that the metal has been found in greatest abundance, but as in the case of the precious metal, at a depth of 200 feet it has not been found in paying quantities; it is questionable also whether larger cupriferous deposits remain to be found at greater depths.

Petroleum.—Several futile efforts have recently been made to obtain this liquid mineral within the district of Barossa. As opinions differ so vastly as to the nature and condition of oil-bearing strata, I am induced to cite here a portion of the article in connection with the above heading, as it appears in the late Dr. Page's "Handbook of Geological Terms":—"It occurs in

various formations, chiefly in connection with fields of coal and lignites, and appears to arise from the decomposition or distillation of these strata by subterranean heat." According to the above, and the treatises of other authors upon the origin of petroleum, it is merely the outcome of entombed animal and vegetable decay under certain chemical conditions. If ever such forms were enclosed in our fundamental rocks these conditions, or more strictly speaking, metamorphic actions, have long since carried the necessary constituents far beyond the point of ordinary liquefaction. Therefore it would be, under the present state of information, a criminal weakness to offer an inducement that the sought-for treasure is sure to be found in these beds (see Professor Tate's Annual Address to the Royal Society of South Australia, 1880-81, pages 124 and 125).

Building Material.

Quartzite.—This material is moderately plentiful in Western Barossa. North of Cockatoo Creek, in Sections 3034 and 3036, abundance of quartzite of medium architectural quality could be obtained; also a very fair building quartzite—though seemingly only fit for rubble work—can be got at Springbett's Quarry, Section 3064.

Marble.—It is not at all improbable that a marble of very fair architectural properties may be procured in Sections 105 and 106.

Clay-Slate.—Though a considerable quantity of clay-slate of late years has been used in Gawler for building purposes, very little of that material comes from Barossa.

Brick-Clay.—Ordinary brick of very fair quality has been and is still being manufactured, as occasion requires, from the drift-clays on the flats of the North and South Para Rivers.

Sand.—Sand of excellent quality for building purposes is obtained from the bed of the rivers; and for the use of the iron and brass founder it is procured of very fair quality from the more friable arenaceous beds of the Miocene deposits immediately to the east of High-street, and the sandy loams on the banks of the rivers.

Mortar.—The travertines of Barossa are very much inferior to those of Mudla Wirra for building purposes; therefore the mortar used in Gawler and neighbourhood is chiefly procured from the adjoining Hundred.

Road Metal.—A considerable part of the road metal used in Gawler is of pebbles from the rivers; travertine is also used to some extent, and is chiefly obtained from the adjoining Hundreds of Munno Para and Mudla Wirra. In Western Barossa a very fair quartzite metal is obtained from Springbett's Quarry, Section 3064; likewise from a band situated in

Section 726, and also from Sections 3035 and 3036. An excellent metal is also obtained in various parts from the highly-ferruginised conglomerates and compact arenaceous beds of the Miocene.

Conclusion.—Geologically speaking, Gawler and Western Barossa, though moderately provided with some of the necessaries calculated to advance people in the general commercial pursuits of life, are not likely ever to attain great mineral prosperity. The soils, formerly of medium fertility, have already yielded their virgin treasures to continuous culture; and the mineral wealth—never proven to be great—has been steadily decreasing since the auriferous drifts of the South Para and Spike Gully were discovered—the former in 1851 and the latter in 1868. Seeing that both these sources of wealth have passed the zenith of productiveness, especially in an agricultural and horticultural sense, at which the greatest possible return can be obtained for the least possible outlay, it now becomes a serious matter to consider can artificial means be applied to replenish in a day, or a year, the treasure which cost nature thousands—possibly millions—of years to provide.

Notes Relating to the Geology between the Burra and Farina.

By Gavin Scoular, Corr. Memb.

[Read August 1, 1882.]

Farina.—A private well, about half a mile north-west from the railway station, had been sunk at the time of my visit, June 18, 1882, to a depth of 81 feet. The section is as follows:—Drift overlying Secondary—probably Jurassic—gypsiferous beds, in which salt water was struck at 35 feet; similar gypsum-bearing strata for a further depth of 32 feet; then a band of fundamental quartzite was encountered, from which no water flows, and penetrated to a depth of fourteen feet. The opinion held by local authorities is that an abundant supply of fresh water will be obtained when the quartzite band is pierced; and all that is needed is to puddle back the inflow of salt water derived from the Drift and gypsiferous strata. The creek, in which the so-called "Government Gums" and "well" are situated, has evidently been excavated out of the Secondary limestone, as throughout the neighbourhood the escarpments consist of it. These limestone elevations do not generally exceed 30 feet in height, and are composed—at the surface at

least—of hard and compact rock; but the lower tracts are composed of gypsum beds, and may be studied in the railway cuttings. The secondary rocks thin away, and leave the fundamental strata entirely exposed at about ten miles south from Farina.

Redhill.—At this Railway Station a large reservoir has been excavated in a very stiff and consolidated clay, probably derived from decay of the fundamental rocks *in situ*.

Leigh's Creek.—For a short distance north, and near this Railway Station, the rocks appear to dip at an inclination of about 65° north-easterly. North of Beltana the dip is south-easterly, and a short way south of the Railway Station the dip, which has greatly decreased, is again north-easterly. Here the beds exhibit a dusky purple colour and flagstone structure; indeed, so much so does the stone seem to partake of the latter quality that I am persuaded excellent flagging is procurable from them. Marble of no mean quality outcrops over the surface of the little rise between the Railway Station and the township, and abounds in the neighbourhood. The Railway Station has been chiefly constructed of a blue marble, and although some few of the blocks in the building might be considered by experts to be somewhat argillaceous, the bulk is exceedingly pure, and capable of retaining a very fine polish.

Black Rock Plain and Terowie.—Bounded at no great distance on either side by the Black Rock Range on the east and the Pekina Range on the west, as a natural consequence the drifts constituting the whole of the Black Rock Plain may pretty safely be looked upon as being water-bearing at no great depth from the surface. In the township of Terowie, west of the railway, Mr. Harrison, the miller, informed me that he obtained a plentiful supply of water in the Drift, immediately overlying a ferruginous cement, at the depth of a little over 60 feet. The water is passably potable, and was used last summer by many of the neighbours to a large extent; in short, its having been in use for steam purposes for a period of over three months, without chipping and cleaning the boiler, is pretty sure indications of its potable qualities. On the eastern side of the railway, and about one-quarter of a mile distant from the site of Mr. Harrison's well, the railway reservoir has exposed in the Drift a similar bed of ferruginous conglomerate about three feet in thickness at about 12 feet below the surface of the plain.

Yarcowie.—About two miles west of Yarcowie Railway Station, on the property of Mr. Alexander Mitchell, the slate rocks dip at an inclination of about 70° westerly, the strike being from 16° to 20° east of mag. north. Interlaced with these slaty beds a prominent reef of very hard crystallized

quartz traverses the country for a considerable distance, in several parts of which the proprietor has discovered cupriferous indications.

Water seems to be readily enough obtained for sinking in this part of the country. Mr. Mitchell has two excellent wells of water on his estate, one of which is situated about half a mile away on the farm, and the other, which is close by the stables at the homestead, was sunk to a depth of 70 feet through a hard blue slate. The water in this well, from which a never-failing supply is obtained, is also passably potable, and has risen fully twenty feet in the shaft.

Burra.—In a cutting immediately north of the Burra Creek, the rocks dip westerly. On visiting the Burra, about seven years ago, I accurately determined the dip of a marble band and surrounding beds to be easterly. The section is in the bed of a small creek immediately north-west of the deserted smelting works, and situated about three-quarters of a mile to the east of the railway cutting. This reversal of the dip of the beds clearly points to the existence of an anticlinal axis between the two points, and the prevailing dip of the rocks in the neighbourhood being easterly, in all probability a synclinal axis occurs in the beds a short distance west of the Burra railway station.

List of Recent Echini of South Australia.

By Professor R. Tate, A.L.S., F.G.S., &c.

[Read October 3, 1882.]

Goniocidaris tubaria, *Lamarck.*

Very general (*R.T.*), ranging from Port Jackson to Eucla on the frontier of West Australia.

Strongylocentrotus eurythrogrammus, *Valenciennes.*

In shallow water. Port Adelaide, St. Vincent's Gulf, Fowler's Bay (*R.T.*).

Sphærechinus Australiæ, *A. Agassiz.*

Washed ashore on the sandy beaches of the South Australian coast (Tenison Woods, Proc. Lin. Soc., N.S.W., vol. ii.).

Temnopleurus toruematicus, *Klein.*

Dredged in life from two to three fathoms off Port Vincent, St. Vincent's Gulf (*R.T.*); identified by the Rev. T. Woods. It also occurs, though rarely, at Port Lincoln, and generally on the south and south-west coast (Ten. Woods, *op. cit.*).

Salmacis globator, *Agassiz.*

Kangaroo Island.

Amblypneustes ovum, *Lamarck.*

Very general, and the commonest urchin of our shores (*R.T.*)

Amblypneustes pallidus, *Lamarck.*

South Australia. Possibly only a variety of *A. ovum.*

Holopneustes porosissimus, *Lutken.*

Var.? Test red, poriferous zone equal in width to the median ambulacral space. Great Australian Bight (*R.T.*)

Echinus angulosus, *Agassiz.*

Near and about Port Adelaide and St. Vincent's Gulf (*Ten. Woods*); Port Lincoln (*R.T.*)

Laganum (Peronella) Peronii, *Agassiz.*

Holdfast Bay (rare); Wallaroo (common) (*R.T.*).

Echinarachnius parma, *Lamarck.*

Common at Guichen Bay (*Ten. Woods*).

Echinocardium australe, *Gray.*

Robe and Aldinga Bay (*T. D. Smeaton*).

Brissus sternalis, *Lamarck* (*?*).

An example collected in Aldinga Bay by Mr. T. D. Smeaton, which measures eighteen millimetres in length, may be a young form of this species.

Schizaster ventricosus, *Gray.*

Aldinga Bay (*T. D. Smeaton*).

Linthia australis, *Gray.*

Common at times in South Australia (*Ten. Woods*). Fowler's Bay (*R.T.*)

On a Winter-Flowering State of Hypoxis pusilla, J. Hooker;

AND

ON THE DIFFERENTIAL CHARACTERS OF THAT SPECIES.

By Professor Ralph Tate, Assoc. Lin. Soc., F.G.S., &c.

[Read June 13, 1882.]

Pasture lands on slaty hill-slopes and loamy flats are abundantly adorned in the months of August and September with the bright yellow star-like blossoms of *Hypoxis pusilla*, J. Hook.; but on the 26th of May, while making close search for the florets of the lowly *Lagenophora emphysopus*, J. Hooker, which I detected in numbers on the pasture slopes of the slaty hills near Belair, overlooking the Adelaide Plain, I was attracted by the matured capsule of a minute lily-like plant. Further exploration revealed the fact that the scanty herbage was largely constituted of the filiform leaves of this species, which presents the salient characters of *Hypoxis pusilla;* but not one of the very many plants examined exhibited expanded flowers. In all stages of flowering the perianth segments were closely adpressed to form a green erect column to the ovary. A few days later I examined the North Adelaide Park Lands at spots which I knew to be yellow with the flowers of this species at a more advanced season, with similar results. These early flowering examples are evidently cleistogamous, the floral envelopes never expanding, and their self-fertilising powers is attested by the abundance of seeds in every capsule. Similar phenomena are exhibited by *Salvia verbenaca*, which has become a troublesome weed, far beyond the limits of the city, during the last five years.

The chief botanical characters belonging to this form are as follows:—Subterranean portions of leaves and scapes enclosed in a membranous sheath, the short, bronze, scarious, ovate, acutely pointed lamina of which appears just above ground. The leaves do not exceed three inches, are filiform with revolute margins rather than channelled; in number never less than two, sometimes three or four. Flowering scape usually very short and one-flowered; sometimes the ovary is not raised above the surface of the ground, whilst in others it is lengthened to half an inch. Two setaceous bracts, usually opposite, are situate at about the middle of the scape. As the ovary ripens

the scape is reflected, and finally by its increased weight is brought to the ground. The outer segments of the perianth are green on the outside and yellow within; the inner alternating ones are yellow, narrower, and shorter than the others. The stamens are six in number—three long and three short—the anthers shortly auricled at the base. The three long stamens are a little shorter than the inner perianth segments, but as long as the style. The stigmatic lobes are three, and papillose; they are closely pressed together by the anthers of the three long stamens, some force being required to overcome the adhesion between the papillose styles and the margins of the open slit of the dehiscing anther cells. The ripe capsule is oblong, subangular, slightly constricted under the perianth, and rugged by pressure of the closely-packed seeds within; it is about four lines long and two in diameter, and dehisces circumcissally at a little below the base of the persistent perianth. The seeds, which are in two rows in each cell, are black, globular, pitted, and are furnished with a prominent hooked hilum.

Except in one main particular these characters are those assigned by Bentham, "Flora Australiensis," vi., p. 450, to *Hypoxis pusilla*, the capsule of which is stated to be globular, and not ovoid or oblong. I have examined a very large number of capsules of the plant species above described, and in only one instance have I noted a globose capsule.

Supplementary Remarks :—Since first observing the winter-flowering individuals of *H. pusilla*, I have carefully watched for their further development, and have concluded that they are succeeded by others approximating in size to *H. glabella*, from which they are distinguishable by sufficiently well-marked though trivial characters.

From July 8 to July 31.—The winter flowers sparingly in number; capsules all burst; no increase in the size of the leaves.

August 12.—Still a few flowering examples of *H. pusilla*, forma *hyemalis*; leaves three to four in number, two and a half inches long, scapes one quarter to half an inch in length. First appearance of expanded flowers, accompanying leaves, four to six in number, and five to seven inches long; scapes three to three and a half inches in length; the flowers correspondingly large. These latter were either from the corms which had previously borne winter flowers, or from those which had already produced leaves at an early period of the year.

August 24.—*H. pusilla*, forma *æstivalis*, in full bloom; in stature varying from the dwarf winter-flowering state to nearly

equalling that of *H. glabella*. The largest blossoms observed at this date measured 9 lines in diameter, outer perianth segment 4, and inner perianth segment 3.75 lines. (Read October 3.)

The summer plant not unfrequently bears two flowers on separate pedicels in the axil of the bracts, as was surmised might be the case by Bentham.

Now, after a very searching inquiry into the habits and morphology of *Hypoxis glabella* and *H. pusilla*, in the course of which I have examined hundreds of specimens of each, I am constrained to agree with Mr. Bentham, and to differ from my honoured and esteemed friend, Baron Sir F. von Mueller, that they are specifically distinct; though at the same time I must acknowledge that the differential characters derived from the relative inequality in length of the stamens and of their auricles, the length of the perianth segments, and the shape of the capsule prove to be inconstant; but taken collectively, and in conjunction with the very decided differences in the bracts, make it easy to separate the species.

H. glabella is a larger plant, stamens nearly equal in length, long anthers, scapes one-flowered, with a large erect sheathing bract, usually one inch long. It inhabits preferentially rich and moist pastures at comparatively high elevations, and flowers in September and October.

H. pusilla, as represented by the type corresponding to our form *hyemalis*, is a dwarf plant with the stamens alternately long and short; short anthers, and scapes with two setaceous bracts, sometimes two-flowered, especially in our form *æstivalis*, which often exceeds in size dwarfish specimens of *H. glabella*. It affects dry and loamy soils at various altitudes, which are watered by direct rainfall. It flowers from May into the summer months.

On a New Dilleniaceous Plant

from Arnheim Land, N.A.

By Baron Sir F. von Mueller and Professor Ralph Tate.

[Read July 5, 1882.]

Pachynema sphenandrum, *spec. nov.*

Branchlets somewhat diffuse or erect, numerous, wiry; six inches high; leaves reduced to small semilanceolar pointed scales; flowers solitary, terminating, ultimately elongated, almost stalk-like and somewhat recurved branchlets; sepals oval-roundish, the inner twice or three times as long as the outer; coronula between petals and stamens, membranous, soon deeply torn into several lobes; filaments obovate wedge-shaped, confluent with the very minute anther; ovaries two, each suddenly terminated by a very short subulate style; fruitlets nearly globular, somewhat longer than the calyx.

At the Gorge, near Yam Creek, on granitic debris; *Prof. Tate.* [Phyt. Mus. Melbourne and Herb. Univ. of Adelaide.]

Branchlets thinner than those of *P. junceum*, from which it also differs in habit; scale-like leaves, hardly exceeding a line in length; calyx at the base, almost angular, turgid; inner sepals about two lines long; petals obovate, at the base cuneate, 2 to 3 lines long, probably white when fresh; stamens about eight, completing a cyclus, slightly incurved, turgid, each resembling a minutely biporose anther; coronula fully as high as the stamens; ovaries glabrous; fruitlets when matured about a quarter-inch long. Ripe seed not yet available.

The development of a coronula and the thickening of the stamens upwards render this plant somewhat anomalous in the genus; still, as all other characteristics, and also the general habit, sufficiently accord with *Pachynema*, it will be best to consider this congeneric, but to establish for it a separate section, to which the name *Stemmatanthus* is to be given, and this appellation may serve also should it be deemed better to isolate this plant generically.

On a New Rhamnaceous Plant from South Australia.

By Baron Sir F. von Mueller and Professor R. Tate

[Read October 3, 1882.]

Trymalium Wayæ, *spec. nov.*

Rather tall, erect; leaves obovate-spatular, not large, nearly flat, above glabrous, underneath as well as the branchlets very thinly grey-velvety; stipules almost semilanceolar, acuminate; panicles short, with several but not numerous flowers; bracts rather small persistent, nearly ovate-lanceolar; pedicels generally not much longer than the flowers; calyx-tube thinly velvety, much shorter than the lobes, the latter glabrescent outside, petals undivided, dilated upwards, gradually narrowed into the base; style exceedingly short; stigma conspicuously three-cleft; disk glabrous.

In the Gorge of the Onkaparinga, by the river side, about three miles above Noarlunga. *Prof. Tate.*

A lax shrub, attaining a height of eight feet. Leaves usually from one-half to three-fourths of an inch, but attaining to one inch in length; decurrent into a short petiole; their vestiture much appressed, but not silky shining. Diameter of expanded calyx about one-eighth of an inch; segments greenish-yellow inside. Petals longer than the stamens. Filaments about as long as the roundish anthers. Disk much depressed, slightly crenulated. Ovary three-celled. Capsule ovoid, two lines long and one and a half lines in diameter; stellately pubescent, and slightly convex at the top, but little elevated above the adnate calyx-tube, and crowned by the persistent calyx lobes. Cocci firmly membranous, apparently indehiscent, slightly wrinkled on the inner face.

General appearance more like *Pomaderris myrtilloides* and *P. vaccinifolia* than any resemblance to congeners, unless in its broad-leaved form to *Trymalium Wichuræ* and to *T. ledifolium*.

The species is dedicated to His Honor S. J. Way, Chief Justice, and President of the Royal Society of South Australia, through whose active interest for the prosecution of phytographic research the discovery of this and some other additions to the Flora of South Australia is mainly due.

T. Wayæ is apparently rare, as only one group of six bushes is known for a length of several miles in the Gorge of the River Onkaparinga. It was flowering profusely in the first week of November, but does not seem to perfect its fruit, inasmuch as not more than seven or eight capsules rewarded a close search undertaken a month later.

On a New Acanthaceous Plant

from Arnheim Land, N.A.

[Read September 5, 1882.]

By Baron Sir F. von Mueller, F.R.S., Hon. Member.

Strobilanthes Tatei, *spec. nov.*

All over densely short-downy; leaves on exceedingly short stalks, or almost sessile, rhomboid- or roundish- or lanceolar-ovate, flat, quite entire at the margin, or scantily indented; peduncles bearing one to three flowers; bracteoles minute; calyces about as long as the pedicels, cleft to the middle into ovate, or narrow semi-lanceolar lobes, the two upper somewhat or scarcely smaller; corolla scantily pubescent outside, its lobes all oblong-ovate, in length about equal to the entirely cylindrical tube, the latter bearded inside towards the orifice; stamens four, equally fertile; filaments free from near the summit of the corolla-tube, conspicuously emerging; anthers, blunt; ovary quadrate-roundish, as well as the style glabrous.

At the Twelve Mile, Mackinlay River; *Prof. Tate* (Herb. Univ. of Adelaide).

Leaves two-thirds to one and one-third of an inch long, of conformity in each pair. Peduncles not much longer than the leaves, or shorter, with terminale pedicels. Imbricate bracts, none. Bracteoles exceedingly short and narrow. Calyces about four lines long. Corolla measuring half to three-quarters of an inch in length, colour purple, the narrow tube passing suddenly into the lobes. Anther-cells free up to the middle, scantily hairy. Stigma not much broader than the style, acute and slightly cleft at the upper end. Fruit not obtained.

This species belongs to the aberrant forms of *Strobilanthes*, its connection therewith being formed by *S. tristis* and *S. Walkeri*, so far as the conspicuous development of pedicels is concerned. In habit it comes nearer to some species of *Calophanes*, notably *C. vagans;* indeed, it could be removed to that genus should the spurred anthers of the latter no longer be insisted on as essential characteristics. Again, the paucity of the ovules and the elongation of the pedicels almost solely remove this new plant from *Ruellia*, unless the fruit should yet offer further remarks for discrimination.

Additions to the Flora of South Australia.

By Professor Ralph Tate, A.L.S., F.G.S., &c.

Introductory Note.—The additions to the list of phanerogamic plants are numerous, the greater part of which results from a revision of the plant species of Australia, and of their geographical distribution undertaken by our illustrious honorary member as a basis for a census of the plants of Australia, now in course of publication; some have already been recorded as varieties in the "Census," and many, through indefiniteness of habitat, had been overlooked. Others forming not an inconsiderable number are recent accessions, and of these no less than thirteen have lately been described as new species by Baron Sir F. von Mueller; they are:—*Phyllanthus Tatei*, *Swainsonia Oliveri*, *Acacia Gilesiana*, *A. Kempeana*, *A. cibaria*, *A. sessiliceps*, *A. estrophiolata*, *Millotia Kempei*, *Helichrysum Tepperi*, *H. Kempei*, *Trymalium Wayæ*, *Dœmia Kempeana*, and *Spartothamus teucriiflorus*.

Some additions to the list of evascular Cryptogams have already been published in the supplement to the 11th volume of the Fragmentorum Phytographiæ Australiæ, but since then other gatherings have been dealt with by the following specialists, and several important discoveries are here now made known for the first time:—Mr. Mitten has determined the mosses; Dr. Cooke, the fungs; the late lamented Dr. Sonder and Dr. J. Agardh, the Swedish veteran algologist, the seaweeds; and Dr. J. Mueller, the lichens.

The total results, excluding a small number of species erroneously introduced in the "Census," are as follows:—

Flowering plants ...	additions,	147,	making a total of	1,727
Vascular Cryptogams	"	2,	"	33
Charas	"	0,	"	7
Mosses	"	7,	"	43
Liverworts	"	0,	"	6
Lichens	"	12,	"	22
Fungi	"	11,	"	97
Algæ	"	28,	"	301
Total additions		207	Total species	2,236

The additions to the geographical divisions are numerous—for Kangaroo Island, eastern part, no less than 125 phanerogams; but I have not thought it advisable to publish them, in

view of an early issue of a new edition of the "Census," which is necessitated by the large increase in the number of species and considerable change in the species-nomenclature.

The regional divisions adopted tentatively in my "Census" as indicative of the lines of immigration of the constituents of our flora may be subject to modification in accordance with the meteorology and geology now somewhat better known. The geographical demarcation of sub-botanic regions can only be approximate, but for practical purposes a boundary line must be drawn. The characteristics, physical and botanical, of each division have to a large extent been gained by personal exploration, but the botanical details can only be ascertained from local observers working throughout the year. To such I make an earnest appeal for help. Some portions of the colony have not at all, or have been very imperfectly examined, or about them more detailed information is wanting. Such are the western portion of Kangaroo Island, south part of Yorke's Peninsula, south and central parts of Eyre's Peninsula, the country about the Coorong, the country towards the Glenelg River, and generally the Far North and West.

DICOTYLEDONEÆ.

Cruciferæ.

Lepidium rotundum, DeCand.; i., 85. Vicinity of Lake Torrens *(Young)*.

Cakile maritima, Scopoli; F. v. M., Native Plants Vict., p. 40. D'Estrees Bay, Kangaroo Island (*R. Tate*).

Violarieæ.

Hymenanthera Banksii, F. v. M.; i., 104. Gorge of the Onkaparinga River, near Noarlunga (*R. Tate*).

Polygaleæ.

Polygala chinensis, Linné, *sp.*; i., 140. Alice Springs (*E. Giles*).

Comesperma viscidulum, F. v. M., Frag. x., 4. MacDonnell Ranges (*E. Giles*).

Malvaceæ.

Sida rhombifolia, Linné; i., 196. Hermannsburg, R. Finke (*H. Kempe*).

Abutilon cryptopetalum, F. v. M.; 201. Hermannsburg, R. Finke (*H. Kempe*).

Abutilon halophilum, F. v. M.; 206. Near Lake Eyre (*E. Giles*); Peake (*J. C. Chandler*).

Abutilon oxycarpum, F. v. M.; i., 204. Near Lake Eyre (*E. Giles*).

EUPHORBIACEÆ.

Micranthemum hexandrum, J. Hooker; vi., 57. Square Waterhole, Encounter Bay (*O. Tepper*).

Beyeria viscosa, Miquel; vi., 64. Dry bed of R. Torrens, near base of Mount Lofty Range (*F. v. M.*).

Phyllanthus Tatei, F. v. M.; S. Sc. Record, March, 1882. Bundaleer Range (*R. Tate*); Victor Harbor (*O. Tepper*).

URTICACEÆ.

Urtica incisa, Poiret; vi., 190. Strathalbyn (*F. v. M.*); R. Murray Flats at Mannum; banks of Cygnet River, Kangaroo Island; and around swamps in the South-East (*R Tate*).

SAPINDACEÆ.

Dodonæa lanceolata, F. v. M.; i., 475. Near the Finke River (*H. Kempe*).

ZYGOPHYLLEÆ.

Zygophyllum Howittii, F. v. M.; Frag., iii., 150; xi., 29. Towards Will's Creek.

RUTACEÆ.

Boronia parviflora, Smith; i., 324. Square Waterhole, Encounter Bay (*R. Tate*).

Eriostemon sedifiorus, F. v. M ; i., 342. Extending to Lake Torrens (*F. v. M.*); Ardrossan (*O. Tepper*).

PLUMBAGINEÆ.

Plumbago Zeilanica, Linné: iv., 267. On the River Finke (*H. Kempe*).

AMARANTACEÆ.

Ptilotus incanus, Poiret; v., 221. Hermannsburg (*H. Kempe*).

SALSOLACEÆ.

Chenopodium rhadinostachyum, F. v. M.; S. Sc. Record, May, 1882. Near River Finke (*H. Kempe*).

Chenopodium auricomum, Lindley; v., 159. Hermannsburg, R. Finke (*H. Kempe*).

Atriplex campanulatum, Bentham; v., 177. Near Lake Torrens.

Atriplex limbatum, Bentham; v., 178. Near Lake Torrens.

Atriplex crystallinum, J. Hooker; v., 180. Sandy sea-shore near mouth of Glenelg River.

Bassia lanicuspis, F. v. M.; v., 195 (Sclerolœna). Near Lake Torrens.

Kochia sedifolia, F. v. M.; v., 187. Murray Scrub (*F. v. M.*), Bunda plateau (*R. Tate*), Fowler's Bay (*Mrs. Richards*).

Salicornia leiostachya, Bentham; v., 203. Near the Finke River (*H. Kempe*), Lake Eyre (*Lewis*), and Lower Barcoo (*Howitt*).

LEGUMINOSÆ.

Lotus corniculatus, Linné; ii., 188. Near Bethanie, Tanunda (*F. v. M.*); grassy margins of swamps, Mount Graham and Riddoch Bay *(R. Tate)*.

Psoralea parva, F. v. M.; 194. Mount Lofty and Barossa Ranges (*F. v. M.*).

Indigofera linifolia, Retz.; 195. Near the River Finke (*H. Kempe*).

Swainsonia Oliverii, F. v. M.; S. Sc. Record, July, 1882. Limestone plateau, near Eucla (*J. Oliver*).

Swainsonia oroboides, F. v. M.; 222. Lower Cooper's Creek (*Howitt*).

Glycine tomentosa, Bentham; 245. Lower Cooper's Creek (*Howitt*).

Galactia tenuiflora, Wight & Arnott; 255. Near the tropics.

Vigna lanceolata, Bentham; 260. Near the tropics.

Cassia pruinosa, F. v. M.; 286. Between Stokes Range and Cooper's Creek (*Wheeler*).

Acacia iteaphylla, F. v. M.; in der Linnæa, xxvi., 617, 1853. Arkaba, collected there by myself in 1851; a well-marked species with the large bracts of *A. suaveolens* and *A. subcœrulea*. Capt. Sturt collected it also in his last expedition—at all events, seeds; from which many years ago I cultivated it in the Botanic Gardens of Melbourne (*F. v. M.*).

Acacia Gilesiana, F. v. M.; Melbourne Chemist, July, 1882. Mount Eba (*E. Giles*).

Acacia Kempeana, F. v. M.; Melbourne Chemist, July, 1882. Near the Finke River (*H. Kempe*).

Acacia cibaria, F. v. M.; Melbourne Chemist, July, 1882. Includes the var. *stenocarpa* of *A. aneura;* and may be identical with *A. brachystachya* of Bentham, inasmuch as flowering specimens of *A. aneura* and *A. brachystachya* cannot readily be distinguished, and both species occur in the same region; the length of the spike is variable. Under these circumstances it seems advisable to abolish the latter specific name. Whether the large-fruited Acacia from Shark Bay really is conspecific remains involved in doubt, as I have seen neither leaves nor flowers of it. Possibly the natives of central South Australia utilise the seeds of *A. cibaria* also for food (*F. v. M.*).

Acacia estrophiolata, F. v. M.; S. Sc. Record, July, 1882. Near the Finke River (*H. Kempe*).

Acacia sessiliceps, F. v. M.; Melbourne Chemist, July, 1882. A well-marked species of the series Calamiformes, but ripe fruit not yet seen for completion of diagnosis; also the peculiarity of stature continues as yet unknown (*F. v. M.*). Near the Finke River *(H. Kempe)*.

Acacia lysiphloia, F. v. M., 393. Near the Finke River (*H. Kempe*).

Acacia dictyophleba, F. v. M.; 388; Frag. iii., 128. Mount Humphries (*Stuart Exped.*); near the Finke River (*H. Kempe*).

Acacia lanigera, A. Cunningham; 324. Near Ardrossan (*O. Tepper*)

Acacia acanthoclada, F. v. M.; 352. Near Fowler's Bay (*Mrs. Richards*).

Acacia Mitchelli, Bentham; 417. Extends to the country about the entrance to the River Glenelg, within South Australian boundary, as noticed by *F. v. M.* in 1857.

Acacia dealbata, Link; 415. In the South-East, from Wattle Range to Wratenbully (*Tenison Woods*).

Acacia Farnesiana, Willdenow; 419. Near the Finke River (*H. Kempe*). Thus four pinnate-leaved Acacias occur in South Australia.

ROSACEÆ.

Stylobasium spatulatum, Desfontaines; ii., 437. Elder Springs, near Mann Range (*J. Forrest*).

HALORAGEÆ.

Haloragis trigonocarpa, F. v. M.; Frag. x., 84. Near Rawlinson's Range (*E. Giles*).

Myriophyllum amphibium, Labill.; ii., 489. Between Mount Compass and Square Waterhole, Encounter Bay (*R. Tate*).

Myriophyllum pedunculatum, J. Hooker; 489. Near the Glenelg River (*F. v. M.*).

MYRTACEÆ.

Bæckea diffusa, Sieber; iii., 76. Square Waterhole, Encounter Bay (*R. Tate*).

Melaleuca trichostachya, Lindley, in Mitchell's Trop. Aust., p. 277. Cooper's Creek (*Howitt Exped.*).

Melaleuca hakeoides, F. v. M.; 151. Near Cooper's Creek (*Dr. Beckler*).

Eucalyptus cneorifolia, DeCandolle; 217. Salt Creek and near Port Lincoln; Kangaroo Island (*Fl. Aust.*, iii., 217).

Eucalyptus tesselaris, F. v. M.; 251. Near the Finke River (*H. Kempe*).

Eucalyptus terminalis, F. v. M.; 257. Near the Finke River (*H. Kempe*).

Eucalyptus macrorrhyncha, F. v. M.; 207; Eucalyptographia i. The chief forest tree of the "stringy-bark" ranges about Sevenhills, near Clare (*R. Tate* and *J. E. Brown*).

STACKHOUSIEÆ.

Stackhousia muricata, Lindley; i., 408. Near the Finke River (*H. Kempe*).

Stackhousia flava, Hooker; 407. Ardrossan (*O. Tepper*).

RHAMNACEÆ.

Pomaderris myrtilloides, Fenzl.; i.,419. Near Eucla (*J. Forrest*).
Trymalium Wayæ, F. v. M. and Tate. Gorge of the Onkaparinga (*R. Tate*).
Cryptandra obovata, J. Hooker; i., 429. Square Waterhole, Encounter Bay (*R. Tate*).

PROTEACEÆ.

Adenanthos sericea, Labill.; v., 354. Kangaroo Island (*Waterhouse, Tate*).
Grevillea agrifolia, A. Cunn.; v., 455. MacDonnell Ranges (*Stuart Exped.*).

LORANTHACEÆ.

Loranthus linearifolius, Hooker; iii, 391. North-west interior (*Stuart's Exped.*).
Loranthus Quandang, Lindley; iii., 395. Cooper's Creek (*Howitt's Exped.*).

UMBELLIFERÆ.

Sium latifolium, Bauhin. Mount Lofty Range (*F. v. M.*)
Oreomyrrhis andicola, Endl.; iii., 377. Mount Gambier, on volcanic soil (*F. v. M.*).

COMPOSITÆ.

Aster stellulatus, Labill.; iii., 473. Near the Glenelg River (*F. v. M.*).
Aster asterotrichus, F. v. M.; 473. Near the Glenelg River (*F. v. M.*).
Aster Mitchelli, F. v. M.; 478. On sandhills towards the Great Bend of the Murray River (*F. v. M.*).
Aster orarius, F. v. M.; 482. A sea-coast plant, near the Glenelg River (*F. v. M.*).
Calotis microcephala, Bentham; 504. Hermannsburg, Finke River (*H. Kempe*).
Brachycome chrysoglossa, F. v. M. R. Murray plains, towards the Darling River (*F. v. M.*).
Epaltes Cunninghamii, Bentham; 530. Murray Desert (*F. v. M.*).
Wedelia verbesinoides, F. v. M.; 538. Finke River (*Stuart Exped.*).
Millotia Kempei, F. v. M.; South. Sc. Record, January, 1882. Hermannsburg, Finke River (*H. Kempe*).
Leptorrhynchos tenuifolius, F. v. M.; 609. Mount Burr (*Mrs. Wehl*).
Leptorrhynchos panætioides, Bentham; 609. Murray Desert (*F. v. M.*).
Helichrysum cinereum, F. v. M.; 629. Rivoli Bay (*Mrs. Wehl*).

Helichrysum Tepperi, F. v. M ; S. Sc. Record, Jan., 1882. Ardrossan *(O. Tepper)*.

Helichrysum Kempei, F. v. M.; Melbourne Chemist, January, 1882. Near the Finke River *(H. Kempe)*.

Helichrysum Dockerii, F. v. M.; 626. Towards the Barrier Range (*Dr. Beckler*).

Humea squamata, F. v. M.; Frag. xi., 86. Murray Scrub, at the boundary line of South Australia and Victoria.

Gnephosis cyathopappa, Bentham; 571. Towards the Barrier Range.

Bidens bipinnatus, Linné; 543. Near the Finke River *(H. Kempe)*.

Candolleaceæ.

Candollea (Stylidium) perpusilla, J. Hook.; iv., 15. Near the Glenelg River (*F. v. M.*).

Campanulaceæ.

Lobelia pedunculata, R. Brown; 133. R. Onkaparinga (*F. v. M.*); at Clarendon (*Tate* and *Tepper*); marshes around Mount Burr Range, S.E. (*R. Tate*).

Goodenovieæ.

Goodenia sepalosa, F. v. M.; iv., 72. Near the Finke River (*H. Kempe*).

Goodenia heteromera, F. v. M.; 76. Murray Desert (*F. v. M.*).

Goodenia humilis, R. Brown; 79. Mount Burr (*Mrs. Wehl*). Mount Graham; Tarpeena; and Cave Range Forest Reserve (*R. Tate*).

Scævola Grœneri, F. v. M.; 88. Bunda plateau, ten to twenty miles from Eucla (*R. Tate*).

Dampiera candicans, F. v. M.; Frag. x., 86. Near the Rawlinson Range (*E. Giles*).

Dampiera marifolia, Bentham; 114. Murray Desert, near the Victorian boundary.

Asclepiadeæ.

Dæmia Kempeana, F. v. M.; S. Sc. Record, August, 1882. Near the Finke River (*H. Kempe*).

Solanaceæ.

Solanum orbiculatum, Dunal; iv., 453. Near Eucla *(J. Oliver)*.

Scrophularineæ.

Mazus pumilio, R. Brown; iv., 484. Marshes from the Glenelg to Cape Northumberland (*R. Tate*); Lake Bonney; Mount Gambier (*F. v. M.*); around Mount Burr Range (*R. Tate*).

Gratiola pedunculata, R. Brown ; 492. River Murray (*F. v. M.*).

Glossostigma elatinoides, Bentham ; 502. River Murray (*F. v. M.*).

Peplidium Muelleri, Bentham, 500, Lake Eyre (Frag. ix., 166).

Veronica peregrina, Linné; 511. Rocky River (*F. v. M.*); Mount Lofty Range (*R. Tate*) ; wet pastures and rocks in the South-East (*R. Tate*).

ACANTHACEÆ.

Ruellia primulacea, F. v. M.; iv., 546. MacDonnell Ranges (*E. Giles*); Alice Springs and Charlotte Waters (*C. Giles*); Barcoo River (*J. McD. Stuart*).

Justicia Bonneyana, F. v. M.; S. Sc. Record, April, 1882. In the eastern interior, within S. Australian territory.

CONVOLVULACEÆ.

Polymeria longifolia, Lindley; iv., 432. Near the Finke River, (*H Kempe*); Cooper's Creek.

Polymeria angusta, F. v. M.; 432. Near the Finke River (*H. Kempe*); Cooper's Creek.

Breweria media, R. Brown; 436. Near Cooper's Creek.

Wilsonia Backhousii, J. Hooker ; 440. Salt lagoon near D'Estrees Bay, Kangaroo Island (*R. Tate*); near Eucla (*J. Oliver*) ; Lake George, Rivoli Bay ; and near Kingston, Lacepede Bay (*R. Tate*).

ASPERIFOLIEÆ.

Rochelia MacCoyana, F. v. M.; iv., 408. Murray Desert (*F. v. M.*).

LABITÆ.

Prostanthera chlorantha, F. v. M. ; v., 108. Mount Barker Creek ; Encounter Bay ; Kangaroo Island (Fl. Aust., v., p. 108) ; Yorke's Peninsula (*Tietkens*).

Teucrium integrifolium, F. v. M. ; 133. Near the tropics.

VERBENACÆ.

Verbena macrostachya, F. v. M. ; v., 36. Near the Finke River (*H. Kempe*).

Newcastlia cladotricha, F. v. M. ; 40.

Clerodendrum floribundum, R. Brown ; 63. Near the Finke River (*H. Kempe*).

SELAGINEÆ.

Dischisma capitatum, Chois ; v. 31. Pine forest between Reed-beds and Port Adelaide (*R. Tate*). Probably introduced.

Myoporinæ.

Eremophila Bowmani, F. v. M.; v. 18. Near Cooper's Creek.
Eremophila strongylophylla, F. v. M.; Frag. x., 87. Western interior (*E. Giles*).
Eremophila Turtoni, F. v. M.; Frag. x., 87. Rawlinson's Range (*E. Giles*).
Eremophila Mitchelli, Bentham; 21. Hermannsburg, River Finke (*H. Kempe*).
Eremophila exilifolia, F. v. M.; Frag. x., 88. Rawlinson's Range (*E. Giles*).
Eremophila bignoniflora, F. v. M.; 25. Murray Desert (*F. v. M.*); Mallee scrub, Tatiara (*Tenison Woods*).

Epacrideæ.

Styphelia striata, Spreng.; iv., 195. Heath between American River and D'Estrees Bay, Kangaroo Island (*R. Tate*).
Brachyloma ciliatum, Bentham; iv., 173. Mount Jagged, Encounter Bay (*O. Tepper*).

MONOCOTYLEDONEÆ.

Hydrocharideæ.

Hydrilla verticillata, Casp.; vi., 259. Waters of the Murray River within S. A. boundaries (*F. v. M.*).
Ottelia ovalifolia, Rich.; vi., 257. Cygnet River, Kangaroo Island (*R. Tate*). Near the Glenelg River; near Mount Barker (*F. v. M.*). "I had it in my manuscript list of S. A. plants already in 1848, as I found it in several water-holes in the Mount Barker District. Possibly it may there have disappeared. I noticed it also near the entrance of the Glenelg River, within S. A. territory" (*F. v. M.*).

Orchideæ.

Spiranthes australis, Lindley; vi., 314. Valleys in sandhills, Rivoli Bay (*Mrs. Wehl*).
Prasophyllum despectans, J. Hooker; vi., 345. Clarendon (*O. Tepper*).
Pterostylis pedunculata, R. Br. Clarendon (*O. Tepper*); Battunga, near Macclesfield (*R. Tate*).
Pterostylis præcox, Lindley; vi., 359. Hog Bay and Kingscote, Kangaroo Island (*R. S. Rogers*, 6-'82).
Eriochilus fimbriatus, F. v. M.; vi., 379 (*Caladenia*). Clarendon (*O. Tepper*).

Commelineæ.

Commelina ensifolia, R. Brown; vii., 83. Hermannsburg, Finke River (*H. Kempe*).

LEMNACEÆ.

Wolffia arrhiza, Wimm.; vii. 162. Lake adjacent to Valley Lake, Mount Gambier; mixed with *Lemna minor* (*R. Tate*).

RESTIACEÆ.

Calastrophus lateriflorus, F. v. M.; vii., 238. East slope of Mount Lofty; Square Waterhole (*R. Tate*); Penola Heath (*Tenison Woods*).

CYPERACEÆ.

Cyperus tenellus, Linné; vii., 265. Square Waterhole, Encounter Bay (*R. Tate*).

Cyperus gracilis, R. Brown; vii., 265. About Lake Eyre.

Cyperus textilis, Thunberg [C. vaginatus var. densiflorus, Bentham]; vii., 273. Near the Finke River (*H. Kempe*); Alice Springs (*E. Giles*); Port Lincoln (*Bowen*).

Scirpus littoralis, Schrader; vii., 334. Hermannsburg, Finke River (*H. Kempe*).

Lepidospora tenuissima, F. v. M.; vii., 365. Square Waterhole, Encounter Bay (*R. Tate*).

Lepidosperma lineare, R. Brown; vii., 395. Clarendon; Meadow's Creek (*O. Tepper*).

Cladium schœnoides, R. Brown; vii., 407. Square Waterhole, Encounter Bay (*R. Tate*).

Cladium trifidum, F. v. M.; vii., 413 (Gahnia). R. Onkaparinga, South of Clarendon (*O. Tepper*).

Caustis pentandra, R. Brown; vii., 420. Heath between American River and D'Estrees Bay, Kangaroo Island; Square Waterhole, Encounter Bay; wet heath, Mount Julian, near Penola (*R. Tate*).

GRAMINEÆ.

Eriochloa punctata, Hamilton; vii., 462. Near the Finke River (*H. Kempe*); Darling River, extending to South Australia (*F. v. M.*).

Aristida ramosa, R. Brown; vii., 563. Hermannsburg, River Finke (*H. Kempe*).

Dichelachne sciurea, J. Hooker; vii., 594. Kangaroo Island (*R. Tate*).

Perotis rara, R. Brown; vii., 509. Hermannsburg, R. Finke (*H. Kempe*).

ACOTYLEDONEÆ.

LYCOPODIACEÆ.

Lycopodium laterale, R. Brown; vii., 675. Between Mount Compass and Square Waterhole (*R. Tate*).

FILICES.

Schizæa fistulosa, Labill.; vii., 69. Clarendon (*O. Tepper*); between Mount Compass and Square Waterhole (*R. Tate*).

Musci.

Bruchia exigua, Hooker and Wilson. Mount Lofty Range (*Dr. Behr*).
Rhabdoweisia cyathocarpa, Montague. Clarendon (*O. Tepper*).
Campylopus introflexus, Hedwig. Mount Gambier (*F. v. M.*); Clarendon (*O. Tepper*).
Glyphomitrium acutifolium, J. Hook. and Wils. South Australia (*Prentice*).
Weisia riparia, Hampe. Gawler River (*F. v. M.*).
Bryum dichotomum, Hedwig. Clarendon (*O. Tepper*).
Tayloria octoblepharis, Hooker. Clarendon (*O. Tepper*).

[Corrigendum:—*Hypopterygium N. Zealandiæ* of former list is *H. discolor*, Mitten.]

Lichenes.

Lichina pygmæa, Agardh. On coast cliffs, St. Vincent Gulf (*F. v. M.*).
Cladonia squamosa, Hoffmann. Clarendon (*O. Tepper*).
Cladonia fimbriata, Schaerer. Clarendon (*O. Tepper*).
Cladonia pyxidata, Hoffmann. Common.
Thysanothecium hyalinum, Nylander. Clarendon (*O. Tepper*).
Stictina crocata, Acharius. Clarendon (*O. Tepper*).
Parmelia molliuscula, Acharius. Clarendon (*O. Tepper*).
hypoxantha, J. Mueller. Clarendon (*O. Tepper*).
versicolor, J. Mueller. Clarendon (*O. Tepper*).
Physcia speciosa, Fries. Clarendon (*O. Tepper*).
Urceolaria scruposa, Acharius. Clarendon (*O. Tepper*).
Normandina Jungermanniæ, J. M. With Stictina crocata, Clarendon (*O. Tepper*).

Fungi.

Agaricus vaginatus, Bulliard. Mount Gambier (*F. v. M.*).
Agaricus salignus, Fries. Lake Bonney (*Mrs. Wehl*).
Agaricus mastoideus, Fries. Barossa Range (*Heuzenroeder*).
Polyporus oblectans, Berkeley. Clarendon (*O. Tepper*).
Polyporus ochroleucus, Berkeley. Clarendon (*O. Tepper*).
Tremella mesenterica, Retzius. Clarendon (*O. Tepper*).
Podaxon carcinomale, Fries. Barossa Range (*Heuzenroeder*).
Cyathus desertorum, F. v. M. Ardrossan (*O. Tepper*).
Cordyceps purpurea, Fries. Ergot on cereals.
Psilosphæria Schomburgkii, Berkeley.
Auricularia minuta, Berkeley. Clarendon (*O. Tepper*).

Algæ.

Sargassum verruculosum, Agardh. St. Vincent's Gulf (*O. Tepper*).
Cystophora camplyocoma, Kuetzing. St. Vincent's Gulf, west (*O. Tepper*).
Zonaria crenata, Agardh. St. Vincent's Gulf (*O. Tepper*).
Zonaria nigrescens, Sonder. St. Vincent's Gulf (*O. Tepper*).

Dilophus fastigiatus, Sond. (*Dictyota*). St. Vincent's Gulf (*O. Tepper*).
Hymenocladia divaricata, Agardh. St. Vincent's Gulf (*O. Tepper*).
Peyssonnelia Tepperi, Sonder. St. Vincent's Gulf, west (*O. Tepper*).
Pollexfenia (?) ciliaris, Agardh. (*n. sp.*) On account of absence of fruit, the genus is not with certainty determinable. St. Vincent's Gulf (*O. Tepper*).
Dictyosphæria sericea, Harvey. St. Vincent's Gulf (*O. Tepper*).
Caulerpa flexilis, Lamourx. St. Vincent's Gulf (*O. Tepper*).
Vaucheria clavata, Agardh. Holdfast Bay (*F. v. M.*).
Schizogonium pallidum, Kuetz. Holdfast Bay (*F. v. M.*).
Cladophora Bainesii, Muell. and Harv. St. Vincents Gulf (*F. v. M.*).
callicoma, Kuetz. St. Vincent's Gulf (*F. v. M.*).
Thoreana, Kuetz. St. Vincent's Gulf (*F. v. M.*).
crystallina, Kuetz. Holdfast Bay (*F. v. M.*).
vaga, Kuetz. Holdfast Bay (*F. v. M.*).
fracta, Kuetz. Holdfast Bay (*F. v. M.*).
subsimplex, Kuetz. St. Vincent's Gulf (*O. Tepper*).
crispata, Kuetz. St. Vincent's Gulf (*O. Tepper*).
Chætomorpha Indica, Kuetz. Port Adelaide (*F. v. M.*).
implexa, Kuetz. Port Adelaide (*F. v. M.*).
Zygnema Dillwynii, Kuetz. St. Vincent's Gulf (*F. v. M.*).
Zygonium affine, Kuetz. St. Vincent's Gulf (*F. v. M.*).
Calothrix confervicola, Agardh. St. Vincent's Gulf (*F. v. M.*).
Epithemia sorex, Kuetz. Holdfast Bay (*F. v. M.*).
Melosira Dozyana, Kuetz. Adelaide (*F. v. M.*).
Navicula arcta, A. Schmidt. Adelaide (*F. v. M.*).

Miscellaneous Contributions

to the

NATURAL HISTORY OF SOUTH AUSTRALIA.

Edited by Professor Tate, Director of the Natural Science Correspondence Department.

Botany.

Additional localities of Acacias known already from South Australia. By Baron Sir F. von Mueller.

Acacia minutifolia, Acacia patens, and Acacia tetragonophylla; Finke River (*Rev. H. Kempe*).

Acacia colletioides (A. nyssophylla). Near Fowler's Bay (*Mrs. Richards*); between the Elizabeth River and Ooldea (*Jesse Young*).

Acacia strongylophylla. Finke River (*Rev. H. Kempe*). Nearest to A. pyrifolia.

Note on the occurrence of Eriochilus fimbriatus in South Australia. By Baron Sir F. von Mueller.

Through the circumspect and continued searches for plants instituted by Mr. Otto Tepper many additional plants from South Australia became recorded, and now he has afforded the means of adding a highly-remarkable orchid found by him quite recently in the vicinity of Clarendon. It is the same plant of which I saw leaves on the Onkaparinga Ranges in 1848, and in two or three of the subsequent years; but I noticed the plant only very scantily, and did not succeed in ever obtaining a flower. This I had occasion to state in a note before the Victorian Field Naturalists' Club, at its last meeting, when flowering specimens collected by Messrs. French and Luehmann in heath ground at Port Phillip were exhibited. This orchid escaped notice because it is one of the earliest harbingers of the spring, and produces blossoms at a time when excursions are seldom made in search of flowering plants. It is, however, known since many years from West Australia—Professor Lindley already, in 1839, having described it as Leptoceras fimbriatum (and also L. pectinatum) from Mr. Drummond's collections. Subsequently it was, as indicated by others previously, joined to *Caladenia*; but it is anomalous in that genus, being devoid of the glands on the upper side of the labellum; it accords

better with *Eriochilus* in the pubescent surface of the labellum as also in habit, differing, however, from the other species of Eriochilus in not dilated lower lobes of the calyx and in the very broad and anteriorly fringed labellum; the occurence of an empty bract on the stem being for generic purposes immaterial, as demonstrated by the genus *Caleya*.

List of Plant Species collected by Mr. J. C. Chandler, Corr. Memb., in the neighbourhood of Peake, Central Australia. By Prof. Tate and Baron Sir F. von Mueller:—

Lepidium phlebopetalum; Abutilon halophilum, A. Fraseri; Sida intricata, Euphorbia erythrantha, Erodium cygnorum, Tribulus terrestris, Claytonia Balonnensis, Ptilotus exaltatus, Kochia villosa, Bœrhaavia diffusa, Crotalaria dissitiflora, Indigofera brevidens, Swainsonia campylantha, Lotus australis var. Behrianus, Cassia Sturtii; Minuria leptophylla, M. Candollei; Calotis hispidula, Pterocaulon sphacelatus, Pterigeron liatroides, Flaveria australasica, Millotia Greevesii, Helichrysum podolepideum, Helipterum floribundum; Goodenia cycloptera, G. glauca; Solanum lacunarium, S. ellipticum; Nicotiana suaveolens, Justicia procumbens, Eremophila Freelingii.

Zoology.

Notes on Two Species of Moths. By E. Guest, Local Correspondent.

The insects to which the following notes refer have been generically determined by Mr. E. Meyrick, B.A. (*Editor.*)

Antheræa sp. (probably *A. Eucalypta*).—"This is the largest of the Bombyces known to me; the expanse of wings is $5\frac{1}{4}$ inches in male, $6\frac{1}{2}$ to $7\frac{1}{2}$ in female. In shape and markings it closely resembles *A. Pernyii* of China, but the colour is much darker, and the round spot is opaque. The larvæ is bright apple green, with a blue tinge along the back. On each of the second and third segments are two blue warts, similar but smaller on the four, fifth, and sixth, and on the eleventh segment a large one. The spiracles are large, oval, and of an orange colour; and between them and the legs there is an interrupted, raised, and broad stripe of indian red colour. The caterpillar feeds on "white gum" saplings, and spins about the third week in February. The cocoon, which is of the size of a small pullet's egg, is very tough and hard, and contains a great deal of silk, but is so mixed with gum as to render it of no use commercially. It passes the winter in this state attached to

the leaves of the food-tree, and the imago emerges about October and continues to be found through November. There is only one brood in the year. This handsome moth is not very uncommon, the larvæ and pupæ are largely preyed upon by magpies and wattle-birds." Further reference to this species will be found Trans. of this Society vol. iv., p. 142 (Editor).

Choragia sp.—"Expanse of wings in male $1\frac{3}{4}$ inch, in female $2\frac{1}{2}$ inches. The great peculiarities of this species are the extremely short antennæ of male, extraordinary shape of the first pair of legs, and the almost entire absence of the third pair of legs.

The fore wings of female are dull, smoky red, with a large dull-coloured triangle of green towards apex of wing, beyond which is another smaller one. Hind wings reddish-salmon colour. Abdomen of female extraordinarily long.

The larva is hard-headed, dirty-white. It gnaws the bark in a ring around the branch of Melaleucæ, and makes a large nearly circular pit on one side of the branch, all of which are covered with a dense opaque web of silk; then it eats down into the pith. It feeds for two years, and remains in the pupa state never more than a week. The perfect insect emerges in January, but it is local and rare."

New Localities for Land and Freshwater Shells. Species determined by Prof. R. Tate.

Helix Bednalli and *Succinea australis*, at Blewitt's Springs; collected by O. Tepper.

Bulinus bullatus and *Paludina Hanleyi*, in the River Bremer, at Salem, near Callington; collected by J. G. Neumann.

Note on the occurrence of a Second Species of Crocodile in Arnheim Land. By Prof. R. Tate.

The common crocodile of the estuaries of the Adelaide, Alligator, and other rivers of Arnheim Land has long been scientifically known, having been identified by Gray as C. porosus.

While at the Port Darwin I saw in the possession of Inspector Foelsche a small gavial-like species, which I refer unhesitatingly to *C. Johnstoni*, Krefft, P.Z.S., 1873, p. 334, and Gray, id., p. 177, tab. 27, 1874, described from a Queensland example. Inspector Foelsche informs me that the species has been known to him for several years, and that it inhabits the inland lagoons and creeks, and appears to be plentiful, and that as far as he can learn it lives only in fresh water. The eggs are long and narrow.

Palæontology.

On Fossil Chilostomatous Bryozoa from Mount Gambier. By Arthur W. Waters, F.G.S. Quart. Journ. Geol. Soc., vol. 38, pp. 257-276, plates 7-9. August, 1882.

"The number of species from Mount Gambier is 67; of these, we have already found 26 in the material I described from south-west Victoria, four are known from Orakei Bay, New Zealand, and I have 21 from Bairnsdale; 30 are now living, of which 25 have been found in Australian waters. Two species are considered identical with species found in the European Chalk, twelve with European Miocene, and twelve with Pliocene. Besides these forms I have found Mr. Woods has described from Mount Gambier *Eschara cavernosa*, *E. Clarkei*, and *E. verrucosa*, *Woods*."—Extract.

Geology and Mineralogy.

Report on Minerals received from Mr. J. Chandler, Corr. Memb., Peake, by Professor R. Tate.

Micaceous iron, intermingled with quartz, and Red Hæmatite, near Tennant's Creek.

Tourmaline in quartz, Barrow's Creek.

Piece of baked clay from sandhill clay pans. Fragment of a hollow sphere, concave face polished; subjacent layers of clay dense, evidently soft clay been pressed upon by a smooth pebble, afterwards baked by sun's heat.

Red ochre of superior quality, found near Peake. Used by the natives in much the same way as the Parachilna-earth is for decoration.

Hemispheres of agglutinated fine particles of sand, exterior surface resembling that of a peach stone.

Common Opal, from 30 feet in Kelly's Well, 30 miles south of Tennant's Creek.

Black Calcite.—Specimens of a mineral, mistaken for coal, have been analysed in the University Laboratory, and found to be *calcite* coloured with finely-divided carbonaceous matter. The mineral is stated by Mr. S. W. Pearce, of Whyte-Yarcowie, to occupy a vein in a dark-coloured slate of from four to six inches thick, and extending in a north and south direction for more than a mile. *R. Tate.*

PLANT-BEARING BEDS between LAKE FROME and the BARRIER RANGES. Communicated by the Deputy Surveyor-General.

These leaves were taken from three wells situated between Lake Frome in South Australia and the Mount Browne gold diggings in New South Wales, in latitude about 30°.

The first well is 45 miles west of the province boundary, near the north end of Lake Frome. Section as under:—

Surface soil	10	feet
Clay	70	"
Compressed wood and leaves in bottom	80	" salt water.

The second is situated at Tilcha Station, near the province boundary, about 35 miles north-east of the well above mentioned. Section:—

Surface clayey loam	10	feet
Sandstone	4	"
Blue clay	76	"
Drift sand and gravel intersected with clays	165	"
White quartzose sand with branches of trees and leaves similar to above ...	5	"
	250	" fresh water.

The third well from which specimens of these leaves were taken by Mr. Jones is situated about 35 miles within New South Wales towards Mount Browne. After sinking 114 feet through clays, &c., the stratum containing the wood and leaves was met with. This well is at present in progress. It may be mentioned that Mr. Jones possesses no information concerning the thickness of this stratum; no wells in the district have been sunk through it; and that the same stratum has been met with in well-boring on the upper watershed of the Darling.

SUPPLEMENTARY NOTE by *Professor R. Tate.*—The leaves which are embedded in a blue clay, belong to one species, as far as can be ascertained from their fragmentary condition. The largest fragment 3 inches long by $1\frac{3}{4}$ wide, belongs to an elliptical leaf, coriaceous in texture, and surface rugose; the mid-rib is thick, and the strong lateral veins which arise therefrom converge towards the margin and become confluent with the marginal vein.

Fragments of a similar clay highly charged with carbonaceous debris contain casts of *Arca*, *sp.*, and of another lamellibranch genus, probably *Cardium*. The formation may be referred to the Miocene epoch.

Section of Strata traversed by Boring at Wirrialpa Station, Frome Downs, about twelve miles south-east of Lake Frome. Communicated by J. A. Niemann, by favour of Mr. J. H. Angas.

Surface not much above sea-level, as far as known. A shaft six feet in diameter was sunk to a depth of 21 feet, when boring was commenced.

NATURE OF STRATA.	THICKNESS IN FEET.
Red clay and gypsum in small pieces	18
Sand, clay, and gypsum in large blocks	11
Solid mass of gypsum	3
Hard close-grained grey sandstone	2
Hard white stone (limestone?)	3
Soft limestone	21
Grey clayey sand [no water]	2
Brown and drab clay	6
Various coloured sands [small supply of salt water]...	5
Drab clayey sand	20
Bluish drift [salt water a little stronger]	2
Drab sandy clay	3
Various coloured stiff clays	52
Slate coloured stiff clay...	18
Gray clayey sand, striped with brown [better water]	8
Slate coloured clay	9
Striped slate coloured clay	8
Gray pipe clay	10
Striped slate coloured clay	10
Grey clayey sand [brackish water]	2
Slate coloured clay	6
Light coloured sandy clay [water]	3
Light green sandy clay	5
Total	227

Boring discontinued through accident to rods.

Statement of Strata traversed by the Boring made for obtaining Water at Waterworks Yard, Stirling North, near Port Augusta. Height above low water mark at Port Augusta, 103·99 feet, found by dumpey level. Recorded by Mr. H. W. Hullett, and communicated by the Hydraulic Engineer.

NATURE OF STRATA.	DEPTH IN FEET BELOW THE SURFACE.
Sandy loam, very dry (red)	26·6
Clean loose gravel [brackish water at 57 feet—eight gallons in 24 hours]	29·0

NATURE OF STRATA.	DEPTH IN FEET BELOW THE SURFACE.
Loamy marl (red)	62·0
Gravel, loose	65 0
Hard shaly clay (red)	80·0
Marly clay	97·0
Clay, with limestone and gravel	112·6
Red clay, with gravel	117·9
Hard limestone	118·6
Clay, with limestone (red)	137·0
Red sand	139·0
Hard limestone	142·0
Limestone and clay (red)	151·6
Hard limestone	153·6
Red clay	157·6
Hard limestone	158·6
Sandy clay	164·6
Limestone, hard	169·0
Clay, very hard, with stones	187·0
Soft yellow clay	189·0
Red clay, with stones	208·0
White clay, hard	250·0
Blue, hard, shaly clay	270·0
Black clay, very hard	278·0
Blue clay, hard [brackish water at 285 feet; for analysis, see "Appendix"]	285·0
Fine yellow sand	335·0
Light coloured drift sand	340·0
Brown coloured drift sand	345·6
Fine drift sand, with carbonaceous matter ...	350·0
Brown coloured sand	357·0
Black carbonaceous mud	357·3
Black drift sand	358·4
Brown coloured drift sand	361·0
Black clay, stratified	362·6
Slate, black, stratified	365·6
Quartz rock	372·0
Gravel, cemented	386·0
Black quartz rock	389·0
Blue clay, with gravel and rock fragments ...	393·6
Hard sand, rock, black	394·6
Black clay, with rock fragments	409·0
Pipe clay	445·0
Coarse and fine white sand	460·0
*Quartz rock	462·0

* This rock proving so hard to the tools in use, further sinking, for the present at least, is abandoned.

NOTE BY EDITOR.—The rock is probably a boulder of quartzite, and not *in situ*. All the superior beds may be referred to the Pliocene Drift.

The water overflowing tubes at bottom of shaft is considerably salter than that struck at higher levels, and it is questionable whether stock will drink it.

Appendix.—Analysis of water at 285 feet, by Mr. George Francis:—

	Grains per gallon.
Sodium chloride	540·25
Sodium sulphate	14·5
Calcium, carbonate and sulphate ...	14.56
Magnesia	9·74
Iron sesqui-oxide	0·65
Silica	0·15

ABSTRACT OF PROCEEDINGS

OF THE

Royal Society of South Australia,

FOR 1881-82.

ORDINARY MEETING, NOV. 1, 1881.

His Honor Chief Justice WAY, President, in the chair.

Donations to Library during past month laid upon the table.

Chas. van Lear Florence, Clarendon; Maurice Salom, Adelaide, and William Henry Tietkins, F.R.G.S., Adelaide, were elected Fellows; and T. C. Cloud, F.C.S., Wallaroo, and J. Chandler, Peake, as Corresponding Members.

Mr. F. G. Waterhouse, Curator of the Institute Museum, sent some eccentric forms of Starfishes* found by Mr. A. Molineux at Port Vincent and the North Arm. Also, some English humble bees and their nests, imported by Dr. Mayo, but which had unfortunately died on the voyage out, this being the second unsuccessful attempt made by Dr. Mayo to introduce them into the colony.

Mr. F. S. CRAWFORD exhibited examples of two species of Coccidæ, one living in great numbers on a Kangaroo Island Acacia hedge at Norwood, the other on the young gum trees growing along the banks of the River Torrens at Adelaide. They are peculiar in possessing one pair of small eyes, widely separated on the upper part of the head, and a second and large pair on the underside; the eyes in both pairs are simple and not multiple in structure.

Mr. J. C. B. MONCRIEFF forwarded for exhibition a fragment of a lower jaw of *Diprotodon*, one of the large extinct marsupials, found nine feet below the surface in a bed of gravel which crosses Section 381, Hundred of Yatala, the site of the new railway carriage shops.

Mr. TEPPER exhibited the head of a large trilobite found by him in the Ardrossan limestone.

Professor TATE exhibited specimens of the plant species *Quinetia Urvillei*, not previously known to occur in this colony, though common in West Australia.

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*NOTE.—*Asterogonium (Tosia) australe*, Gray (R. Tate.)

The PRESIDENT showed, on behalf of Mr. Horn, a specimen of the New Zealand vegetable caterpillar, out of whose head had grown a long-stalked fungus which fed on the juices of the caterpillar until they were exhausted, at which time the fungus had attained maturity.

Mr. TODD exhibited two photographs of the new transit instrument provided for the Adelaide Observatory, which had entirely superseded the old instruments used for the purpose. The telescope was provided with two circles 30 inches in diameter, both of which were read off by four micrometer microscopes. A room was now being built for its reception, where it was intended to be placed on granite foundations, and in a short time he hoped to be placed in a much more favourable position for taking observations than he had been formerly. In a short time the meteorological department of the Observatory would be very much enlarged, and the whole institution would be placed on a footing of equality with the great European observatories so far as the instruments were concerned.

Mr. TODD then read his paper on "The Recent Atmospheric Disturbances on the East Coast."

Mr. TODD, C.M.G., F.R.A.S., read a paper on the Transit of Mercury to take place on the 8th instant. He invited gentlemen desirous of taking observations to bring their instruments to the Observatory, and he would supply them with chronometers.

ORDINARY MEETING, DEC. 6, 1881.

His Honor Chief Justice WAY, President, in the chair.

Donations to the Library were announced.

A resolution was agreed to that the hour of meetings be 8 p.m., instead of 7.30 p.m.

Mr. F. G. WATERHOUSE, Curator of the South Australian Museum, exhibited three species of freshwater fish recently taken from hill streams near Mount Compass.

Mr. STIRLING SMEATON exhibited a living specimen of *Echidna hystrix* (Porcupine Ant-Eater) from the South-East.

The PRESIDENT showed some freswater fishes found in creeks near Yankalilla.

Prof. R. TATE, referring to remarks made by Mr. J. G. O. Tepper at last meeting respecting the New Zealand caterpillar, confirmed the same.

Prof. R. TATE exhibited specimens of the following plant-species hitherto unrecorded for South Australia:—*Hybanthus Tatei* and *Pilularia globulifera*, from Wilpena Pound, and *Carex*

breviculmis, from near Clarendon. These three species made up a total of 29 new to the flora of the colony, which had been added to it since the publication of the census last year, and the success which had attended the exploration of Mr. Tepper, himself, and others was most encouraging. A great deal could be done towards the elucidation of our flora, he pointed out, by working out the life-history of many plants which as yet are known only in the shape of dried specimens. He also took the opportunity of describing Wilpena Pound, where two of the specimens exhibited that evening had been obtained, and of urging that the Pound—which botanically was quite an oasis—should be made a Government Reserve.

Mr. J. H. Angas forwarded to the Society a statement of the various strata met with in an unsuccessful bore for water put down in the neighbourhood of Lake Frome. The boring-rod had stuck when at a considerable depth, and another bore was being put down at the spot first selected. The expense may be calculated at about 30s. per foot. (See p. 99.)

Professor Tate said there had been a great deal of criticism in the papers with respect to the teachings of scientific geologists, and they had been twitted with not agreeing; and the tone of some of the letters seemed to point to adverse opinions being given by professional men on a piece of alleged coal found in the Northern Areas. For the sake of geological science he wished to explain how the two opinions were likely to be correct. He then pointed out that the stuff first found on the Woolundunga Forest Reserve, and sent to the Forest Board, was pronounced by the Chairman of the Board and others as a substance that might be carbonised remains of mallee roots. He judged that this deposit had not been found to be a thing likely to pay. The Forester watched closely the operations of the people who had found it; but he had absented himself for two hours once, and on returning coal had been discovered. This second coaly material had afterwards been shown to him, and he had no hesitation in pronouncing it to be good Newcastle coal. (Hear, hear.)

The President—It was taken there.

Professor Tate—Picked up on the railway line, or brought there from Port Augusta. He had gone with the Conservator of Forests to the spot when the discovery was first reported, and from extended geological observations he was sure no coal did occur there. The opinions given on this subject had not been given on the same object, and both were doubtlessly true.

Mr. C. Todd, F.R.A.S., read a paper entitled "Notes on Observations of the Transit of Mercury," but explained that he read it in order simply that the matter might be formally

brought before the Society, as the facts had already been laid before the public.

Mr. T. D. Smeaton said he had observed the transit, and corroborated the facts which Mr. Todd had published.

Mr. T. B. Adamson said he also had observed the transit, but had not seen the black drop that they had looked for. Mr. Todd had referred to an invitation having been given by himself to any gentlemen who had telescopes to go to the Observatory and assist to observe the transit, but had said that no one had responded. He would have been glad, but he had been there on the previous night, and intended to go back, only he found there was no shelter, and it was windy. There had been some very interesting spots on the sun recently. He had seen the large red spot on Jupiter very clearly lately.

Mr. Todd said as to the red spot on Jupiter, which he believed he had been one of the first to observe, it was becoming hazy, as though a volume of cloud were forming over it. He thought it might be that they were looking down upon the lower atmosphere, or perhaps the surface of the planet, and that clouds were now intervening. As Jupiter's satellite had been seen through the edge of the planet, it showed that much of what appeared to be the planet was surrounding atmosphere. He had seen two of the rings of Saturn the other evening very plainly, and should be glad to assist any one who was curious on the point, but it was seldom so good an opportunity presented itself.

Mr. S. Pollitzer, C.E., read a paper entitled "Formulæ for determining Elements of Railway Switches and Crossings," and explained them on the blackboard.

A paper by Mr. E. Guest, "Notes upon two South Australian Moths," was read. (See p. 95.)

Ordinary Meeting, February 7, 1882.

His Honor Chief Justice Way, President, in the chair.

The donations to the Library were laid upon the table.

Wm. Gardner, Esq., M.D., Edward Davies, Esq., William Fowler, Esq., and John Thomas Smyth, Esq., B.A., were elected Fellows.

The Curator of the Adelaide Museum exhibited a specimen of meteoric iron found in the Gawler Ranges, near Yardea, in 1875. The meteorite was found in a superficial limestone about fifteen inches under the surface of the ground, and contains a certain proportion of nickel. Also a "Sea Pen," and a Plaice caught by the South Australian Fishing Company.

Mr. Molineux said, in reference to the Plaice shown, it was found at the mouth of the Port Creek, and was the first one he

had seen in the colony, although he had paid much attention to fish during his long residence here.

A letter was received from Mr. H. Marshall, of Angaston, asking if there was a public analyst competent to analyse rocks, ores, &c. He mentioned that he had fifty specimens from the district, which he deemed of value. The PRESIDENT said the question of the appointment of a Government Analyst was under the consideration of the Governors of the South Australian Institute and the Council of the University, and an expression of opinion from the Society might have some weight.

On the motion of Mr. ADAMSON, seconded by Mr. C. A. WILSON, it was resolved—"That the Society considers it desirable that a Government Analyst should be appointed."

Mr. C. A. WILSON read a paper upon "A New Species of the family Proclotupidæ":—"I exhibit a specimen new to me of the family *Proclotupidæ*, a minute kind of ichneumon fly, but I cannot name the genus to which it belongs. During last month I went up Sismey's Gully, and found as in olden days many of their egg-shaped cocoons under the hanging bark of the eucalypti, where the caterpillars had fallen, and there changed to chrysalides. They are very common at this time of the year, and are the manufacture of a caterpillar, producing a small brown moth. On opening the box a few days ago I found a single hole in two of these cocoons or nests, from which had evidently issued all these minute flies, the parent insects having inserted all their eggs in the body of the victims before they assumed the chrysalis form. I should add that my little specimens have elbowed antennæ, or what are at half their length hung at right-angles downwards, and keep in constant motion, as if feeling their way. I have seen some of these minute creatures of this family before, but never, I believe, this species."

The SECRETARY read a continuation of the list of plants indigenous to the vicinity of the Peake, MacDonnell Ranges, by the Rev. H. Kempe.

The SECRETARY read a paper contributed by Mr. J. G. O. Tepper, F.L.S., entitled "Observations on the Habits of Ants."

In the discussion that ensued, there was one point in the paper that called for remark, and that was a statement that where ants congregated slugs disappeared. A Fellow said he found that not to be the case, as he knew of at least two gardens where ants and slugs were alike numerous. The small ants made large colonies at Port Vincent, for instance, and that point differed from the statement of the writer of the paper. It was also mentioned that, contrary to a remark made in the paper, all ants were not afraid of water, as some had

their colonies in a place where they were almost surrounded by water. It was noticed also that ants shunned the heat of the day. In reference to measures for expelling ants, it was stated that kerosine poured through spills of paper into their nests proved effectual; the application of fine wood ashes or sand also caused them to forsake the nest. Other Fellows said they had used hot and cold water, carbolic acid, bi-sulphide of carbon, gunpowder, and other remedies, but without avail.

Another paper by Mr. Tepper, consisting mainly of extracts from the Proceedings of the Linnean Society of London, was read. It contained a description of the Mahwa-tree (*Bassia longifolia*), a well-known tree of India. The introduction of this useful prolific tree into Australia was recommended, with the argument that the natives of the interior would, by the cultivation of the tree, be supplied with a sweet and nourishing diet from the Mahwa, which would thus compensate for the game destroyed by the settlers. It was also mentioned that the tree had been introduced into England with great success, and the flavour of bacon from pigs fed on it was much improved.

Ordinary Meeting, March 7, 1882.

Dr. E. C. Stirling in the chair.

Mr. W. J. E. Middleton and Dr. Alex. Henry were elected Fellows.

Mr. Chas. Todd, F.R.A S., C.M.G., &c., stated that the new transit instrument for the Adelaide Observatory had arrived, but the building was not erected for it. He had also received a new anemograph and a sunshine recorder.

Mr. R. A. White, Superintendent of Signals, South Australian Railways, read a paper on "Safe Working of Railways."

A discussion followed, in which the Chairman, and Messrs. Todd, Pollitzer, Rutt, Cotton, Roberts, and Allen took part.

Ordinary Meeting, April 4, 1882.

Mr. D. B. Adamson in the chair.

The donations to the Library were laid upon the table.

Dr. Robertson, the Rev. N. Rodgers, of Moonta, and Messrs. R. J. Rigaud and L. C. E. Gee were elected Fellows of the Society.

The Assistant-Secretary exhibited specimens of stone from the Hundreds of Erskine and Oladdie, and taken from a depth of 60 feet while well-sinking. These specimens, he said, were interesting as showing what kind of rock the distressed farmers had to penetrate in order to obtain water. There

were 4 feet of alluvial soil at the top; then about 16 feet of a bluish hard clay; then 15 feet of a conglomerate, containing in some cases jasper, and in others ironstone; and next about 10 feet of a hard adamantine rock, under which was a white gravel, which in most cases contained good water. The same kind of sinking was met with at Morgan, except that there was more of the blue clay in that neighbourhood, and one man who sank a shaft there reached a depth of 90 feet, the chief part of the strata passed through being blue clay, after which came the conglomerate, and finally the hard adamant-like rock.

Dr. Mayo exhibited some queen humble bees, which were dispatched to him by Mr. Alfred Neighbour, of London, who wrote that he had sent ten humble queens or mother bees. The package had been placed under the care of the butcher of the Sorata, to be kept in his ice-house, so that the bees might remain in a dormant state. This seemed acknowledged to be the only condition in which it was possible to have the bees safely carried. The receiver of the bees was advised by Mr. Neighbour to open the boxes and allow the bees to fly (if alive) in the middle of a fine day. Nothing could be done in the way of provision for them; they must be allowed to fly and seek their own place for a nest. This plan was followed, when the writer sent some of the bees to New Zealand last year, but only two survived. The time of year when the letter was written (February), or earlier in the winter, was chosen because the fertile mothers only survived and hybernated so as to come forth in the following summer as the founders of a nest or colony. Dr. Mayo remarked that he had tried two or three times to get the bees out alive, but had failed. Seven of the bees arrived, and unfortunately these all proved to be dead. Dr. Mayo was thanked for the trouble he had taken in this matter, and a hope was expressed that his next experiment would prove more successful.

Mr. C. A. Wilson made a few remarks on M. Maxime Cornu's work entitled "Studies on the *Phylloxera vastatrix*," which he temporarily placed at the disposal of the members of the Society. He received the volume from the Commissioner of Crown Lands through the agency of Sir Arthur Blyth and Mr. A. R. Wallace, about a year ago. It was written in French, and had added to it many plates of the insects spoken of shown in all their stages, and beautifully tinted. The work was accompanied by a translation in English.

Mr. T. D. Smeaton read a paper by Mr. J. G. O. Tepper, F.L.S., entitled "Notes and Descriptions of some Rare South Australian Lepidoptera," with coloured figures. Mr. Smeaton also read a paper by Mr. Tepper entitled "Notes on some New Australian Plants."

ORDINARY MEETING, MAY 2, 1882.

His Honor Chief Justice WAY (President) in the chair.

The donations to the Library were laid upon the table.

The HON SECRETARY announced the gift by the Waterworks Department of a complete set of the strata gone through in a well-boring at the Waterworks Yard, near Kent Town.

Mr. D. B. ADAMSON exhibited a planosphere of the Southern Hemisphere, whereby the position or time of rising or setting of any indicated star or planet may be discovered almost instantaneously, and at any time of the day or night.

Professor R. TATE directed attention to a pseudo-morphite of *quartz* after *calcite*, forwarded by Mr. J. G. O. Tepper from Clarendon. The same gentleman had also forwarded a piece of *fluor spar* and a presumed fossil in slate from Field's River.

Mr. S. POLLITZER mentioned that, during an excursion to the neighbourhood of Field's River in search of the traces of the glacial period in this colony some time ago discovered by Professor Tate, he had found a large block of granite, quite distinct from the prevailing geological character of the district; and Professor TATE stated, in reply, that Mr. Stirling Smeaton had also found traces of the same erratic at various points on the coast cliffs north and south of Hallett's Cove, the bay into which Field's River discharges.

Dr. E. C. STIRLING exhibited and explained William's Freezing Microtome, intended for making large sections of animal tissues for microscopical purposes by the medium of ice and gum solution. The instrument may be popularly described thus:—A cylindrical wooden box, about six inches diameter and six inches high, having a metal cylinder in the centre, is filled with equal parts of ice and salt. This is then covered with a glass lid, having in the centre a small round or square metal plate. On this plate the tissue to be operated upon is gummed after being saturated with highly concentrated gum solution. This metal plate comes into contact with the cylinder passing through the middle of the ice and salt mixture, and the gum above is consequently frozen; but as it freezes in its natural state without undergoing crystallization, it enables the razor to cut the frozen tissue without fracturing it. The razor is mounted in a frame, regulated by sett-screws, enabling the operator to shave off a section $\frac{1}{600}$ of an inch in thickness, or even thinner. Dr. Stirling exhibited several large sections of animal tissues, mounted for microscopical purposes, as made by the use of this instrument, and remarked that one possessed an historical interest. He explained that when in England lately he made application to the Home Secretary for licence to try some experiments upon dumb

animals, with a view to testing the virtues of ligatures made from the sinews from kangaroo-tails, which he believed to be far superior to those made of "catgut" so called, because the latter, being made by a process of partial decomposition, were liable to melt away within twenty-four hours when used as a ligature around an artery, and thus occasioning great danger to the patient; but the sinews from the kangaroo-tails, being in a natural state, would last for many days, and in the meantime a proper closure of the artery would take place, and the ligature would in time be absorbed. The Home Secretary, in his wisdom, refused the application, and he was obliged to wait for an opportunity to try the experiment upon a human subject. This opportunity occurred, and proved to be eminently successful, though the patient died after a lapse of ten days. The death, however, occurred through other causes, and the ligature was then examined, and it was found that the artery was properly closed, whilst the ligature was in process of absorption, as shown by the section of the artery exhibited by him.

Professor Tate mentioned that whilst in the Northern Territory Inspector Foelsche had shown him in life the several plants used by the natives there medicinally, including the *Sarcostemma australe*, which is used by the natives as a remedy for smallpox. As the disease supposed to be smallpox had not prevailed amongst the natives there since the occupation by the present white population, there were no means of ascertaining the reputed virtue of the plant, which extended as far south as the vicinity of Wallaroo.

The President asked if it was known when the last epidemic of supposed smallpox occurred in South Australia, and the Assistant-Secretary stated that in the early part of 1839, when he arrived here, many of the natives were much pitted with marks, which they ascribed to a visitation just previous to the advent of the white men on these shores. Other speakers followed, and it was mentioned as a curious circumstance that the disease, which appeared to be so fatal to the aborigines, seemed never to have been communicated to the white settlers; but it was also pointed out that the epidemic in South Australia occurred before its settlement by Europeans, whilst that in the Northern Territory occurred after the abandonment of Port Essington, and before the advent at Port Darwin of the present settlers.

The Assistant-Secretary mentioned that he had noticed great quantities of blood exuding through the skin and at the caudal extremities of some Port Jackson sharks which he had caught and carefully abstained from wounding in any manner. The body on the softer parts assumed a red blotched appear-

ance, and the blood seemed to come out like a perspiration whilst the sharks were dying.

The Hon. Secretary stated that Mr. W. L. Wragge, one of the members, had received the gold medal of the Scottish Meteorological Society for a valuable series of observations taken during several months on Ben Nevis, Mr. Wragge taking the higher station, and Mrs. Wragge recording at the lower one at Fort William.

The paper upon "Diurnal Lepidoptera of Balhannah District," being almost purely technical, was taken as read, Professor Tate giving a brief *résumé* of its contents; and the same course was adopted with Mr. J. G. O. Tepper's paper upon "Some South Australian Lizards."

Ordinary Meeting, June 13, 1882.

Mr. D. B. Adamson in the chair.

The donations to the Library since last meeting were laid upon the table.

Dr. H. Whittell, Messrs. R. B. Robin, T. W. Harris, G. E. Farrar, J. W. Tyas, and F. W. Davis were elected Fellows, and Mr. Maurice Holtze, Curator of the Botanic Garden, Palmerston, was elected a Corresponding Member.

HONEY-BEARING ANTS.

Professor Tate directed attention to some samples of honey-bearing ants, similar to some submitted to the Society on two previous occasions. They were the remarkable honey-bearing ants which had been described by Sir John Lubbock as coming from Adelaide, but it was now known where they were really to be found. The locality was Barrow's Creek. One of the Society's Corresponding Members (Mr. Chandler) had sent down specimens of the ant (*Campotropus inflatus*) from Barrow's Creek, and another species collected by Mr. Michael May.

Mr. Smeaton remarked that although the Mexican honey-bearing ant fed the other varieties of its species while it lived, yet when it died they made no attempt to open the abdomen, where the honey was secreted.

Professor Tate exhibited a small orchid forwarded by Mrs. Richards of Fowler's Bay. It was a Tasmanian specimen (*Pterostylis mutica*), the westerly distribution of which had now been extended several hundred miles.

The Secretary exhibited a specimen of quartz crystal from the roof of the bed rock at Inglewood, Victoria, at a depth of 80 feet from the surface. It seemed to have included in it what appeared to be tufts of grass.

Professor Tate thought the appearance was due to radial fracture.

Professor TATE read a paper upon the winter-flowering state of *Hypoxis pusilla* (Hooker). (See p. 76.)

SMALLPOX AND AUSTRALIAN ABORIGINES.

A communication from Mr. W. H. Tietkens, F.R.G.S., was read in reference to a previous discussion on the subject of smallpox amongst the natives of Australia. He stated that the Rawlinson Ranges, which are situated in S. latitude 24° 30′, E. longitude 127° 42′, were visited by Ernest Giles and himself in 1873. The Range, quite in the heart of the continent, was surrounded on all sides by a vast extent of uninhabited country, quite of a desert character, waterless, and covered with dense scrub of mallee and mulga, and only under the most favourable circumstances could it be traversed by the natives, and until he and his companion went there it certainly had never been visited by whites. There they found a people quite isolated from the rest of the world, breathing the pure dry air of the interior, who wandered in small communities from place to place, who seldom camped or remained a whole day in one place, deeply marked with smallpox. What measures they took to prevent contagion or alleviate their sufferings, or how many were carried off, would probably be never known. Of fifteen or twenty men who visited the camp eight were unmistakeably marked with smallpox. Professor Tate, while at Palmerston, was shown a plant which the natives of that country, it was supposed, used as an antidote. In the list of plants by Baron von Mueller collected upon the expedition the *Sarcostemma australe* is mentioned as having been found upon the Rawlinson Ranges.

The germs of the disease suspended in the air, might, in densely populated countries, propagate contagion, but those would be destroyed by the hot winds and summer's sun in crossing such tracts of waterless and uninhabited country. If, then, a people were found under such circumstances who were subject to the disease, how could we expect immunity who were at times somewhat negligent, the writer asked.

Mrs. Richards on this subject wrote that at the end of 1866 and the early part of 1867 the natives of Streaky Bay and Fowler's Bay had what was supposed to be smallpox, great numbers of them dying. A few of the affected were still living, and very much pitted, more especially an old lubra, who was blind; although constantly with them, no white person was known to have taken the disease.

Professor TATE said Mrs. Richards mentioned the fact that Dr. Gething was sent by the Government to attend to the natives at Streaky Bay, and he (the speaker) wrote to him touching his experience. The doctor called upon him, and he

said he treated the disease as smallpox, to which it had a close similitude, presenting similar symptoms, but he was not prepared to deny that it was not smallpox. The natives at Streaky Bay declared that the disease came to them from the North. He had hoped to have had dates to go upon, but there was not sufficient data to enable him to trace the line of the dissemination of the disease, or settle the question whether it was an endemic disease or had been introduced by the Malays.

NEW PLANTS.

A communication from Mr. O. Tepper was read concerning some new plants. He said three plants had been mentioned as not before known to occur in South Australia. The first was a cyperaceous plant, growing in clefts of rock where a spring of water was oozing out; the long narrow leaves, 6-9 feet, growing in large tufts, gracefully draped the precipice and fallen boulders where it was found. Its scientific name was *Cladium trifidum* (F. v. M.), hitherto known from Tasmania, and occurred to the writer's knowledge only at one very picturesque spot on the Onkaparinga River three miles south of Clarendon. The second plant was a small orchid, *Prasophyllum despectans* (J. Hooker), which had not been known before out of Tasmania. It seemed here very rare in the scrub of the hills. The third was a *Drosera* or sundew, seemingly quite new, which sent its flower-stalk from the dry hard soil, and flowered a month before the leaves appeared. Baron von Mueller considered it a close relation to, but not identical with, *Drosera squamosa*, a West Australian species.

Professor TATE read a paper on the "Strata passed through in the Kent Town Bore Hole."

Professor Ascherson's letter on the propagation of *Cymodocea antarctica* was taken as read.

ORDINARY MEETING, JULY 5, 1882.

His Honor Chief Justice WAY, President, in the chair.

The donations to the Library since last meeting were laid upon the table.

Professor TATE said the Society was honoured with the presence that evening of their only lady and corresponding member, Mrs. Richards, of Fowler's Bay, who had kindly handed in a number of very interesting articles made by the natives of that portion of the country. These articles comprised:—

"Yallow," a wooden vessel.

Hank of yarn of wombat fur.

"Manou," yarn of wombat fur dyed with red ochre.

"Wirri-wirri," a distaff for spinning yarn of wombat fur.

"Markety," a skull-cap made of netted coloured yarns of wombat fur.

"Wadder," a bag made of netted wombat-yarn; a wooden needle.

"Chena," a sock made of netted wombat-yarn; worn to conceal tracks.

"Youghendah," a circular pad of wombat-yarn, placed on head to support the "yallow."

"Currarah," a head ornament, consisting of two slight sticks crossed at right angles, around which is secured a spiral of yarn; the frame is supported by a stick fixed at right angles to the frame.

"Cuckaling," cord of entwined human hair.

"Talpo chinto," *i.e.*, (white) tails of the "talpo," a small mammal; used for tying up the beard by way of ornament.

"Chewety," a neck ornament composed of entwined wombat-yarns, and decorated with the foxy-coloured tail-tips of the "wallbady," a small mammal—*Myrmecobius*, probably.

"Muderbur," red ochre, with which the natives smear their bodies; also used for dyeing fur.

"Tulah," flint chips used for self-laceration, and affixed to shafts of wood as weapons.

[The articles enumerated have subsequently been acquired by the South Australian Museum.]

A short discussion took place on these articles, and they were acknowledged to be of a most interesting character, and afforded evidence that the natives must have had a knowledge of the art of spinning before the whites inhabited that portion of the country.

The Natural History Director also showed a piece of bone forwarded by Mr. H. Lattorff, and found 30 feet below the surface, about 70 miles north of Port Augusta. This bone was a fragmant of a sacrum, not yet known to what animal it belonged; also from Mr. J. W. Jones, the Deputy Surveyor-General, some fossilised leaves found in three wells, situated between Lake Frome, in South Australia, and the Mount Browne diggings, in New South Wales. A small collection of beetles collected at the Peake by Mr. Chandler was exhibited.

The following papers were read:—

1. Upon the "Land and Freshwater Shells of Tropical South Australia." By Prof. R. Tate.

2. "Diagnosis of a new Dilleniaceous Plant from Arnheim Land." By Baron F. von Mueller and Prof. R. Tate.

3. Dr. Whittell read an interesting paper, and illustrated with diagrams and the use of the microscope some recent and extraordinary discoveries made by Dr. E. Abbe, Professor in

Jena, of optical principles involved in the phenomena of microscopic vision and their application to the construction of the microscope. Dr. Whittell explained Dr. Abbe's interpretation of the manner in which the microscopic image is formed, and of the appearance of certain details in this image, which he shows to be due to the diffractive influence of the internal structural constitution of the object examined upon rays of light transmitted through it.

ORDINARY MEETING, AUGUST 1, 1882.

Mr. D. B. ADAMSON in the chair.

Donations to the Library since last meeting were announced.

Professor R. TATE, F.G.S., produced some specimens of a substance, long known to have existed on the south side of Kangaroo Island, which had been analyzed by Mr. Dixon, of New South Wales, and pronounced by him to be a species of pitch, which Professor Tate believed to be a waif from some wrecked vessel, and was a very good Stockholm pitch. Some resin had been forwarded from Fowler's Bay by Mrs. Ann Richards, and some beeswax and guttapercha had been found by himself at the Head of the Australian Bight; and at Eucla, these led to the conclusion that some ship laden with chandlers' stores had been wrecked on the coast.

A specimen of some black mineral was forwarded under the impression that it was coal, and a statement accompanied it that the sender had submitted it to the Surveyor-General, who could not state what it was, and a large block of land had been taken up under the mineral regulations, with the idea that a coal mine existed there. Professor Tate had proved the substance to be calc spar, coloured with carbonaceous matter.

Mr. H. CHANDLER, of the Peake, forwarded a number of specimens from that neighbourhood, consisting of hæmatite, naturally-baked clay polished on one side, some red ochre, hemisphere of agglutinated sand, common opal, quartz and micaceous iron said to contain gold (from the Peake), micaceous iron, tourmaline.

Mr. HOGARTH sent specimens from a well-sinking 260 feet deep, on the Mombra Station, near Mount Browne, on the frontier of New South Wales, containing almost solid masses of iron pyrites and shells, which Professor Tate referred to the Jurassic genus *Aucella*.

Professor TATE then read a paper, contributed by Baron Ferdinand von Mueller, upon "Some additional South Australian Acacias."

A paper by Mr. GAVIN SCOULAR, Corresponding Member, was

read in abstract form by Professor Tate, in the absence of the author, on "The Geology of the Neighbourhood of Gawler."

Some "Notes relating to the Geology between Burra and Farina" were also given, having reference chiefly to the water-bearing properties of the rocks at Farina, Redhill, Blackrock Plains, and Yarcowie; also to certain stratigraphical phenomena at Farina, Beltana, and Burra.

Ordinary Meeting, September 5, 1882.

His Honor Chief Justice Way, President, in the chair.

Donations to the Library since last meeting were laid upon the table.

Messrs. R. A. White, Superintendent of Signals, Railway Department, and Leonard William Haacke, Ph.D., Curator of the South Australian Museum, were elected as Fellows.

Mr. Charles Todd exhibited Campbell's sunshine recorder, which has been used at the Observatory for some time. The duration of the sunshine was, he need hardly point out, an important factor in climatology. The instrument was simple in construction, but its records were very valuable. It was one of the many means by which philosophers made Nature record her own operations. It consisted of a sphere of glass four inches in diameter, and a card being introduced in the focus of the parallel rays, the image of the sun falling upon the card burnt its track upon the card, which was graduated. He explained, by means of the blackboard, the principle of the sunshine recorder. In answer to a remark of Professor Tate, Mr. Todd said it would be a great advantage if a system could be devised whereby not only the particular portion of the sky overcast, but the density of the clouds themselves could be recorded. The effect of a dense cloud, of course, would have a greater effect than a thin cirrhus cloud.

Professor Tate drew attention to some mineral specimens from Eudunda sent by Mr. E. Bayer. They consisted of carbonate of iron and brown oxide of iron. There was nothing particularly remarkable about the specimens.

Baron Sir F. von Mueller's paper on a "New Acanthaceous Plant from Arnheim Land," was taken as read.

Dr. James Mann, M.D., Medical Officer of the Destitute Poor Department, read a paper entitled "Notes upon the Life History of a Human Blood-worm." He gave a technical description of the worm, which is known to science as the *Filaria sanguinis hominis*, and he related the result of his observations in China, where the natives were infested by the worm. The mature filaria was very thin, but measured two or three inches long, had a distinct alimentary canal, and reproductive ap-

paratus. After being discharged from the body of the mosquito the worm found its way into the stomach of the human subject through the water drunk. The parent selected as its habitat one of the lymph channels of man. Thence it discharged myriads of embryos, which found their way into the vessels which carried on the circulation of the blood. The embryos were incapable of further development, or of performing the functions of reproduction. They could only attain sexual maturity by the intervention of an intermediary host. That host was furnished by the mosquito, which dined on the blood of man. The embryos exhibited an extraordinary periodicity, being present from 7 p.m. till 7 a.m., and disappearing from the blood entirely during the day. No one knew where they went. That periodicity was influenced and modified by sleep. The filaria was very frequently associated with certain pathological conditions. Another peculiar characteristic was that if the patient slept in the day-time, and kept awake at night, the filaria appeared in the blood in the day, and not at night. Taken into the stomach the filaria might be acted upon by the gastric juice, but it sometimes succeeded in penetrating into the tissues, and had a peculiar aptitude for selecting the lymph tracts as its resting place.

There was a conversational discussion upon the subject of the paper, and the opinion was expressed that having mosquitoes here the filaria might also be found, but so far it had not been detected.

Dr. Whittell asked whether the parasite affected the Europeans as well as the natives. Dr. Mann said the Chinese drank water from the paddy-fields, and to that water mosquitoes had access, whereas Europeans were very careful to drink only filtered water. In answer to further questions, Dr. Mann said females predominated; the male worm had only recently been found. A portion of it was found in the neighbourhood of the groin-gland of a patient in Amoy, China, but the discovery was so recent that no further information had been obtained.

Annual Meeting, October 3, 1882.

His Honor Chief Justice Way, President, in the chair.

The list of donations to the Library was read.

The annual report and balance-sheet were read. (See p. 121.)

The President, in moving the adoption of the report and balance-sheet, said that the former very clearly defined the operations of the Society. That evening he would retire from the Presidency of the Society. He had filled that position with pleasure to himself, but perhaps not to the Society. During

the past two years it had been a source of gratification to him to attend the meetings of the Society, and he was indebted to the Science Director and to others for the very able and cordial support they had accorded him during his tenure of the position of President. And it was a source of gratification to him that the position he was about to vacate would be filled by a gentleman who well deserved the office. He alluded to their astronomer, Mr. Todd, C.M.G. (Applause.)

Professor Tate, in seconding the adoption of the report, said there was a great want in the direction of illustrating natural history specimens. He had been rendered valuable aid by the late Mr. C. H. Strother in that department. Mr. Strother, an able artist, had just got his hand in to the peculiar work when he died. The work was very difficult, and he was sorry to say that in Mr. Strother the Society had lost an aid most difficult to replace. He had illustrated some of the fossil lamp shells of South Australia, and his work had been spoken of highly. The volume to come should certainly be illustrated, and attention should be directed to the matter. The Chairman said the Government Printing Office now enjoyed facilities in the way of reproducing drawings in coloured lithography. If the Society applied to the Government they might allow the illustrations to be produced.

The report and balance-sheet were adopted, and ordered to be printed.

The following officers were elected for the ensuing year:—President, Mr. C. Todd, C.M.G.; Vice-Presidents, Dr. Whittell and Mr. D. B. Adamson; Hon. Treasurer, Mr. Smeaton; Hon. Secretary, Dr. Cleland; Council, Dr. Haacke, Dr. Stirling, Mr. Rutt, and Professor Tate.

In reference to the retirement of Mr. Rutt from the post of Hon. Secretary, the Chief Justice expressed regret at the loss of his services.

On the motion of Mr. Todd, a vote of thanks to the Fellows retiring from the Council—the Hon. S. J. Way, C.J., Mr. Chapple, and Dr. Mayo—was carried.

Mr. Todd attributed to the interest taken in the Society's operations its success during the past year. Dr. Mayo and Mr. Chapple, retiring from the Council, had rendered valuable service. In reference to Professor Tate, who was the first President of the Royal Society of South Australia, he spoke in high terms of that gentleman's ability, zeal, and energy. Mr. Todd then thanked the Society for electing him President.

The Chief Justice returned thanks, and said it had been his intention to read a paper, but his time had been unusually occupied during the year, especially with regard to two offices he held. He had therefore been glad to find that his friend Dr.

Thomas, who for some time past had been devoting great attention to the subject, was prepared to read a paper on the "Statistics of Hydatid Disease in Australia." And the present was an appropriate time for the doctor's researches to be made public.

Mr. Smeaton reported that the amount subscribed towards the Darwin Memorial Fund was £16 16s., but other persons had promised.

ALTERATION OF THE RULES.

An alteration in the rules making the hour of meeting 8 p.m. instead of 7.30 was confirmed.

Mr. F. S. Crawford gave notice of motion that the Council make arrangements for interim and informal meetings of members.

Mr. C. Todd made some reference to the comet appearing in the eastern heavens. He had watched it very carefully. It occupied a very sparse star part of the heavens, and was a grand object, occupying a part of the sky with no rival. He saw it on Saturday morning, and it was then rapidly approaching the sun, and the following Sunday it had passed its perihelion. It was so bright that it could be seen at noonday. Mr. Russell and Mr. Ellery had secured its meridian position. Since it had passed its perihelion it had retraced its path amongst the stars, and was now receding from the sun, and as it receded its tail increased very rapidly. It had increased from fourteen degrees to twenty. As the tail grew the nucleus became smaller, and it seemed as if passing from the head into the tail. He produced a drawing of the appearance of the comet as seen on Tuesday morning. It was reduced to a very bright streak, and looked like a ring fore-shortened. It was not unlike the comet of 1842 in some respects.

Mr. Todd also mentioned that steps were being taken to determine the longitude of South Australia, and the English astronomers had selected Lieutenant Darwin to visit Australia in connection with the work, and Mr. Stone had written that Lieutenant Darwin would observe the transit of Venus next December in Queensland, after which he would proceed to Banjoewangie and Singapore, there to exchange signals with an Australian observer at Port Darwin. It had been desired that he (Mr. Todd) should go to Port Darwin to make observations, but he could not leave.

Exhibits.—Specimens of *Pterostylis pedunculata*, an orchid new for South Australia, collected at Clarendon by Mr. O. Tepper, and in abundance at Battunga, near Echunga, by Prof. Tate.

The following papers were read:—

"Supplementary Notes on Hypoxis pusilla," by Professor R. Tate.

"A List of the recent Echinoidea of South Australia," by the same.

"Additions to the Flora of South Australia," and a "Diagnosis of a New Rhamnaceous plant," by Baron F. von Mueller and Prof. Tate.

"On Hydatid Disease in Australia," by Dr. J. Davies Thomas.

This paper was introductory to one in preparation by the author on the "Statistics of Hydatid Disease in Australia," and its publication is consequently postponed. On the blackboard, and with the aid of diagrams, he explained the nature of the hydatid's operations. He pointed out the nature of the ravages the parasite could commit in the human system, and referred to the researches and experiments made by scientists resulting in remarkable discoveries calculated to prove beneficial to man. He expressed a hope that, seeing the spread of hydatid disease in Australia, some competent persons should make most careful experiments, with a view to doing away with any errors that might exist. Next to Iceland, Australia showed more hydatid disease than any other place in the world. He had experimented upon thirteen dogs, and six out of the thirteen were infested with *Tenia echinoccus*. Considering that many contain immense numbers of eggs, it was something alarming. The tapeworm was twice as common among dogs in Australia as in Iceland. The minute eggs of the pest were, no doubt, taken into the human system through water drunk. Sheep and oxen took in the minute ova with herbage or water, and the seeds of the disease were sown. The gastric juice softened the eggshell, and the movements of the stomach broke the shell, releasing the embryo, which immediately bored its way into the walls of the stomach. Very soon it met with a blood-vessel, and thus found its way to the liver, where it obtained a congenial location, and developed into a hydatid. In concluding his paper the doctor intimated that on another occasion he would enlarge upon the subject, and would give the statistics.

Report of the Council

OF THE

Royal Society of South Australia

FOR THE YEAR ENDING SEPTEMBER 30TH, 1882.

In laying before the Society their report upon the work done during the past year, the Council feel that the numerous papers read at the ordinary meetings justify them in the hope that the forthcoming volume of the Society's Transactions will be fully equal in interest to its predecessors.

The Society has continued to receive through the Natural Science Director many specimens for exhibition and identification, and a good deal of information about the natural history of the province. The corresponding members and local correspondents are encouraged in their researches by the aid given to them in the identification of their specimens, and the assurance that all that is of value in their observations will be placed on record in the Society's Transactions. More than two years ago the Society commenced the systematic registration of the strata traversed by wells and borings, but the number thus recorded has hitherto borne a very small ratio to what might have been tabulated. The Hon. Commissioners of Public Works and of Crown Lands at the time kindly acceded to the request of the Council that all information obtained from Government sinkings should be forwarded to the Society, and printed forms were supplied to the heads of Departments for the purpose. Particulars of several borings have been received from the Hydraulic Engineer and the Engineer-in-Chief, but none of the numerous wells sunk by the Surveyor-General's Department in the outlying districts. This is to be regretted, as such information would be especially valuable. Fellows and local correspondents would render great assistance in this work if they would inform the Secretary of any wells about to be sunk either by local authorities or by private persons, in order that blank forms might be forwarded to the proper parties, and correct records obtained.

The attention of the Society having been drawn to the difficulty and expense of obtaining correct analyses of mineralogical specimens, a resolution was passed affirming the desirableness of the appointment of a public analyst, and was forwarded to the Board of Governors of the South Australian Institute and to the Council of the University, who had the same question under consideration, but up to the present time the want remains unsupplied.

The membership of the Society has increased during the year from 102 to 123, of all classes, the increase being almost entirely in the class of Fellows, thus showing an increased interest in the work carried on. Two Fellows—Mr. R. Ingleby, Q.C., Mr. C. H. Strother—have been removed by death. Mr. Ingleby's connection with the Society dated from the year 1861, and his active interest in its proceedings continued unabated until failing health compelled him to withdraw from attendance at its meetings.

THE TREASURER IN ACCOUNT WITH THE ROYAL SOCIETY OF SOUTH AUSTRALIA.

Dr.	£	s.	d.
To Balance, Oct. 1881	173	7	0
Subscriptions	74	16	0
Government Grant	94	13	0
Sale of Transactions	0	12	0
	£343	8	0

Cr.	£	s.	d
By Cost of Transactions	80	3	0
Assistant Secretary's Salary and Collector's Commission	21	12	0
Advertising and Printing..	21	1	10
S.A. Institute for Rent	12	0	0
Furniture	4	14	0
Postages and small Stationery	2	6	9
Balance in Bank	201	10	5
	£343	8	0

Audited and found correct,

E. PARISS NESBIT, Auditor.

3rd October, 1882.

THOMAS. D. SMEATON, Treasurer.

LIST OF FELLOWS, MEMBERS, &c.,

November 7, 1882.

Those marked (F) were present at the first meeting when the Society was founded. Those marked (L) are Life Fellows. Those marked with an asterisk have contributed papers.

HONORARY FELLOWS.

		Date of Election.
Angas, Geo. French, F.L.S., C.M.Z.S.,	Norland-square, London ..	1879
Barkely, Sir Henry, G.C.M.G., K.C.B.,	Royal Colonial Institute, London	1857
Ellery, R. L. J., F.R.S.	Observatory, Melbourne ..	1876
*Garran, A., L.L.D.	Sydney	1853
*Hull, H. M.	Hobart Town	1855
Jervois, H. E. Sir W. F. D., G.C.M.G., C.B.	Government House ..	1878
Little, E.	.. .. ..	1855
Macleay, W., F.L.S.	Sydney	1878
*Mueller, Baron F. von., K.C.M.G., F.R.S., &c.	South Melbourne	1879
Russell, H. C., B.A., F.R.A.S. ..	Observatory, Sydney ..	1876
Warburton, Col. P. Egerton ..	Beaumont	1858
*Wilson, C. S.	Supreme Court	1853
*Woods, Rev. J. E. Tenison, F.L.S., F.G.S., &c.	162, Albion-street, Surrey Hills, Sydney	1877

CORRESPONDING MEMBERS.

Bailey, F. M., F.L.S.	Botanic Gardens, Brisbane ..	1881
Canham, J.	Stuart's Creek	1880
*Cloud, T. C., F.C.S.	Wallaroo	1881
Chandler, T.	Peake	1881
*Foelsche, Paul	Palmerston	1880
Goldstein, J. R. Y.	Office of Titles, Melbourne ..	1880
*Hayter, H. H., F.S.S.	Government Statist, Melbourne	1878
Holtze, Maurice	Palmerston	1882
*Kempe, Rev. J.	Finke, MacDonnell Ranges ..	1880
*Richards, Mrs. A.	Fowler's Bay	1880
*Scoular, Gavin	Blair, Smithfield	1878
*Tepper, J. G. Otto, F.L.S. ..	Clarendon	1878

FELLOWS.

*Adamson, D. B.	Angas-street	1867
Addis, W. L.	Currie-street	1879
Angas, J. H.	Collingrove, Angaston ..	1874
Biggs, Col. J. H.	Edwardstown	1878
Brown, L. G.	Two Wells	1882
Brunskill, Geo.	Morgan	1878
Burchell, F. N.	Survey Office	1881
Caterer, T. Ainslie, B.A.	Norwood	1882

Chalwin, Thomas	Currie-street	1877
Chapple, F., B.A., B.Sc.	Prince Alfred College ..	1876
Cleland, W. L., M.B.	Parkside Asylum	1879
*(L) Cooke, E.	South-terrace	1876
Cox, W. C.	.. .. ..	1880
Crawford, F. S.	Surveyor-General's Office ..	1865
*Davenport, S.	Beaumont	1856
Davies, Edward	Hutt-street, Adelaide ..	1882
Davis, F. W.	*Advertiser* office	1882
Dobbie, A. W.	Gawler-place	1876
Elder, Sir Thomas	Grenfell-street	1871
Farrar, G. E.	Adelaide	1882
*Fletcher, Rev. W. R., M.A. ..	Kent Town	1876
Florance, W.	Clarendon	1881
Fowler, W.	Yarroo, Kulpara	1882
Gall, D.	Tynte-street, N. Adelaide ..	1865
Gardner, W., M.D.	Adelaide	1882
Gee, Lionel	Survey Office	1882
Goss, Charles, M.D.	North-terrace	1877
*(F) Gosse, William, M.D.	Kent Town	1853
Goyder, G., jun.	Government Offices ..	1880
Haacke, Wm., Ph.D.	Institute	1882
*Hamilton, Geo.	Adelaide Club	1868
Harris, T. W.	*Register* Office	1882
Harrold, Arthur L.	Hindley-street	1876
Harry, Thos.	Exchange	1878
Hay, Alexander	Beaumont	1861
Hopkins, Rev. W.	Glenelg	1880
*Hullett, J. W. H.	Port Augusta	1876
Johnson, J. A.	Currie-street	1875
Joyce, J. F., L.R.C.P. *et* S. ..	South-terrace	1880
*(F) Kay, R.	South Australian Institute ..	1853
Knevett, S.	Carrington-street	1878
*Laughton, E.	Currie-street	1874
*Lloyd, J. S.	Lefevre-terrace, N. Adelaide	1856
*Macgeorge, Jas.	King William-street ..	1855
Madley, L. G., Principal of Training School	Whitmore-square	1879
Magarey, A. T.	Barton-terrace, N. Adelaide	1873
*Magarey, S. J., M.B.	North-terrace	1874
*Mann, Jas., L.R.C.P. *et* S. ..	Adelaide	1882
Mayo, G., F.R.C.S.	Morphett-street	1853
Mayo, G. G.	Engineer-in-Chief's Office ..	1874
Meyrick, E., M.A.	Christchurch, N.Z. ..	1881
Middleton, W. J. C.	Kangarilla	1882
Molineux, A.	Kent Town	1880
(L) Murray, David	North Adelaide	1859
Nesbit, E. P., jun.	King William-street ..	1875
Nesbit, W. Peel, M.B.	N. Adelaide	1880
*Pellitzer, S.	Engineer-in-Chief's Office ..	1881
Rees, John, M.R.C.S.	Hindmarsh	1880
Rees, Rowland	Waymouth-street	1874
Rigaud, R. John	*Register* Office	1882
Robertson, R., F.F.P.S.	King William-street south ..	1882
Robin, Rowland B.	Grenfell-street	1882
Rogers, Rev. Nicholas	Moonta	1882
Russell, W.	Commercial-rd., Port Adelaide	1879
*Rutt, Walter	Engineer-in-Chief's Office ..	1869

Salom, M.	N. Adelaide	1881
*Schomburgk, R., Ph.D., &c. ..	Botanic Gardens	1865
*Smeaton, Stirling, B.A.	Medindie	1882
*Smeaton, T. D.	Bank of South Australia ..	1857
Smith, R. Barr	Torrens Park, Mitcham ..	1871
Smith, William	Hydraulic Engineer's Office	1880
Smyth, J. Y., B.A.	Engineer-in-Chief's Office ..	1882
Sparks, H. Y.	Glenelg	1878
*Stirling, E. C., M.D., M.A. ..	Lefevre-terrace	1881
Stuckey, J. J., M.A.	Victoria Chambers, King William-street	1878
*Tate, Prof. Ralph, F.G.S. ..	University of Adelaide ..	1876
Telfer, W.	Wallaroo Hospital ..	1880
*Thomas, J. Davies, M.D.	North-terrace	1877
Thomas, R. G.	Unley	1877
Thow, W.	S. A. Railway	1878
*Tietkins, W. H., F.R.G.S. ..	Adelaide	1881
*Todd, Charles, C.M.G., F.R.A.S., M.S.T.E., &c.	Observatory	1856
Tomkinson, S.	Adelaide	1876
Tyas, J. W.	University of Adelaide ..	1882
Umbehaun, C.	General Post-Office ..	1879
*Verco, Joseph C., M.D.	Wellington-square ..	1878
Vickery, G.	Meadows	1868
Ware, W. L.	Victoria Chambers, King William-street	1878
*Waterhouse, F. G., C.M.Z.S., &c. ..	S. A. Institute	1859
Way, His Honour S. J., C.J. ..	North Adelaide	1859
Way, E. W., M.B.	North-terrace	1878
White, R. A.	Engineer-in-Chief's Office ..	1882
*Whittell, H., M.D.	Glenelg	1882
Wragge, C. L., F.R.G.S.	.. ..	1877
Wyatt, Wm., M.D.	Burnside	1859
Young, Wm., B.A.	Hindmarsh	1881

ASSOCIATE.

*Rogers, R. S., B.A.	Hackney	1880

LOCAL CORRESPONDENTS.

Salter, W. H., Blinman	Lattorff, H., Whittata
Boyer, E., Eudunda	Debney, G. L., Crystal Brook
Courderot de Malange, A. H., Fremantle, W.A.	Guest, E., Balhannah

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